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Waste Liquor Pilot Plant Starts Operations

Sulphite Paper Manufacturers' Committee Overcomes Obstacles of Priorities and Completes Large Scale Pilot Plant For Recovery of Pulp Mill Waste — Employment Rises — Other Mill News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., August 2, 1943 — This week marks the start of operations on a trickling filter plant here that it is hoped will be the greatest stride yet taken to solve the problem of sulphite waste liquor. Defying priorities and scarcity, the Sulphite Paper Manufacturers' Committee on Waste Disposal succeeded in completing a large scale pilot plant adjoining the Interlake Pulp and Paper Company mill, a division of Consolidated Water Power and Paper Company. Up to now it has been one of the most interesting of the projects studied, twenty of which have been completely evaluated.

The new plant, the filter of which is 15 feet in diameter, was built after experimental work on the trickling filter was done on a small laboratory filter, and later observations gained from two years' operation of a semi-scale plant containing two 30-inch filters. Located on the bank of the Fox River, the plant includes the 15-foot concrete filter, a pump house and five storage tanks. Sulphite waste liquor under treatment is transferred from a storage tank connected to the Interlake sulphite digesters.

In this process raw liquor is diluted and nutrients added, after which it is pumped to a disc distributor which sprays it over rock on which micro-organisms have developed in a heavy film. The biological actions oxidize the sugars present in the liquor, forming cell material as a byproduct. This cell material or slude has value as a fertilizer, and may provide a return of part of the costs of operating the filter to the mill.

Although paper mills both here and abroad have spent millions of dollars and experienced over a period of 60 years or more on the problem, no successful method of utilization or disposal has been found which is applicable to the industry at large. Dr. John P. Weidner, technical director of the Hoberg Paper Mills, Inc., Green Bay, Wis., made an estimate in a recent speech that there is a loss of four and one half million tons of waste liquor solids per year in the United States and Canada.

This 5-year research and evaluation program was begun in 1939 by a group of Wisconsin sulphite pulp manufacturers and is financed by them on a per-ton contribution basis. The Institute of Paper Chemistry at Appleton is the headquarters for research, and J. M. Holderby, a sanitary engineer, was research coordinator until granted leave of absence to enter the army as a captain in the Sanitary Corps. The acting coordinator is A. J. Wiley. The chairman of the industry's executive committee is J. M. Conway, president of the Hoberg mills. There is also a technical committee. Each mill is represented on both committees and holds meetings regularly to evaluate the work as it progresses.

Great difficulty was experienced in gathering materials, parts and fittings for the new pilot plant, recently completed. The War Production Board permitted its construction only on condition that no priority rating would be needed or used to purchase any part of it. The specified materials were located in second hand stocks and in the hands of dealers who could release them without priority. They were located through persistent efforts of a travelling representative who spent several weeks in this search.

Several other processes are being evaluated in the Institute laboratories, and it is hoped that concentrated efforts now being spent on a few major studies will help to resolve the problem earlier than would have been the case under the older independent method of attack. Active projects at present include three on disposal, seven on utilization and one of a general nature. Sulphite alcohol processes are among those being investigated for their recovery of by-products as well as for reduction in stream pollution. The staff of the Institute also is working cooperatively with the committee on the problem of recovering valuable by-products from the lignin fraction of waste liquor.

Manpower in Woods Expected to Improve

Wisconsin mills looks to the specific designation by selective service officials of pulpwood cutting as an essential occupation to help relieve the impending pulpwood shortage. Appeals will now be made to local draft boards to keep a large number of men in the woods to replenish the dwindling logging supply.

A. B. Hansen, manager of the Northern Paper Mills, Green Bay, Wis., and now serving as deputy

(Continued on page 18)

Wrapping Paper and Box Supply Serious

Midwest Reports Concern Is Felt At Prospect of Lack of Adequate Supply of Paper and Paper Boxes For Holiday Trade — Vetoes Trucking Bills—Salesmen Hold Golf Outing—Other Late News.

CHICAGO, Ill., August 2, 1943—The Chicago paper market spent the week dividing its time between trying to fill orders and conjecturing as to what the next news from Washington would be. The situation was not conducive to stability of the market inasmuch as the priority system of paper orders for Army and Navy needs continued to provoke argument as to just how much paper is available and where or where not the shortages do or do not exist.

The Situation in General

In general, demand showed no signs of letting up as buyers strove to prepare for a Fall business period where the civilian goods picture is becoming somewhat brighter. Real concern was developing locally over the wrapping paper and container situation as jobbers in this area continued to forecast real shortages even before the holiday situation gets under way. Sulphites were in strong demand in all lines with the heavily increasing costs increasing the squeeze all along the line, according to reports. Krafts were far behind in orders while books and covers reported continued increases in the order back log. The waste paper market was no more optimistically reported than last week when collections were said to not be sufficient to remove the shortage situation here.

Vetoes Trucking Bills

Governor Green has vetoed trucking legislation previously reported in these pages as having been approved by the Illinois Legislature. The bills would have provided a permanent permissable length for tractors and semi-trailers of 40 instead of 35 feet. With the veto the situation remains as it did in Illinois as far as motor transport of paper and paper supplies is concerned.

Salesmen To Hear Rubber Story

The western division of the Salesmens Association of the Paper Industry is planning an especially attractive meeting for Monday, August 23, at which time Dr. M. N. Rosten of the Ontario Pulp and Paper Company of Thorold, Ontario, will be present to explain the utilization of the sulphite waste liquor program of his mill which is owned and operated by the Chicago Tribune. The waste liquor is utilized in the making of synthetic rubber in a simple and comparatively inexpensive procedure which has already brought commendtaion from Rubber Chief Jeffers and other students of the rubber shortage problem. Efforts will be made by the Association to develop a large attendance of members and guests for a meeting which will bring to the Association a first hand story of this newest contribution of the paper industry to the general welfare of the country.

Hold Successful Golf Outing

The quick change of golf courses from Sunset Ridge to the Westward Ho Country Club, made necessary by the manpower shortage situation at the former club, failed to dampen the ardor of the golfing salesmen of the Salesmen's Association of the Paper Industry. A goodly number assembled on July 23 for the afternoon and evening events with prize winners announced by Chairman Berge as follows:

Low gross, Fred Middleton, Millprint Products Company of Milwaukee; high gross, C. O. Edgerly, American Paper Goods Company; first low net, George Black, Bradner Smith & Company; second low net, John Schoemer, Parker, Thomas & Tucker; third low net, J. Powell, Bermingham & Prosser; fourth low net, G. Olson, American Writing Paper Company; fifth low net, C. Hoppenwrath, Blunden Lyon Company; sixth low net, G. Moss, Western States Envelope Company; seventh low net, Luke Johnsos, Zellerbach Paper Company, and eighth low net, C. Atwood, Atwood Paper Company.

Low putt first and second honors went to Fred Leahy, La Salle Paper Company and Irving McHenry, Mid States Gummed Paper Company. The high net foursome winners were T. Gorman, L. Ransom, William Jones and E. D. Buchanan. Low net honors went to Bob Swan, F. Swatek, John Schoemer and an "unknown" whom the publicity department failed to list. Low putt awards went to R. C. Johnson, J. Powell, A. Brown and Fred Leahy while John Schoemer won his third prize for the blind bogey.

Lynn Paper Co. Opens Chicago Branch

Among the new businesses locating in Chicago as announced by the Chicago Association of Commerce is the Lynn Paper Products Manufacturing Company of Detroit. The new branch facilities of the company are located at 6407 Wentworth avenue.

Plan to Expand Warrensburg Mill

WARRENSBURG, N. Y., July 26, 1943—Isadore Baum, of Brooklyn, head of the Warrensburg Pulp and Paper Company, operators of the former Schroon River Pulp and Paper Company plant in Lewisville, was at the Colonial Arms with Mrs. Baum for several days recently visiting the plant acquired some months ago.

Mr. Baum, who also operates several other paper mills, said he is more than pleased with the operation of the mill where his firm had made several changes and altered the building.

His superintendent here, Edward Murphy, reported that many former employees had returned to their old positions with more arriving each week.

Mr. Baum also stated that his firm had received priorities for additional machinery which will be installed as quickly as it can be received and that if possible it is expected to run the plant seven days a week.

Mr. and Mrs. Baum are making an inspection of all mills owned by the firm.

Rising Costs Limit Newsprint Profits

Estimates of Canadian Mill Earnings Indicate Higher Gross Income This Year—Total Income Likely To Rise 10% Above 1942 — Abitibi Shareholders Jointly Seek New Reorganization Plan.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., Aug. 2, 1943—Just what net effect the new prices for Canadian newsprint will have on the year's earnings of newsprint mills is quite a guess. It seems reasonable, however, to assume that these companies will not be any worse off this year than they were last year. Gross receipts will be slightly higher, but production will be lower this year. Actual costs will depend largely on the costs of pulpwood.

The second four dollars a ton boost, coming into effect September 1, had small effect on newsprint stocks, following the recent announcement. Apparently, the advance had been well discounted by the stock market by the time the recent announcement was made public. Newsprint issues remained relatively stable or very slightly off from their high points for the year.

Rising Costs Limits Future Profits

The difficulties in the way of estimating the importance of the price increase to individual securities had a restraining effect on the market. Although it was well known that cost increases had warranted the rise of $8 a ton from the price obtaining at the beginning of the year and that this had been concurred in by both the Wartime Prices and Trade Board in Canada and the Office of Price Administration in the United States, all companies are not affected in the same way by rising costs. While pulpwood costs affect all in the same way, income from subsidiary production, such as chemical pulp, and the level of operations and output are factors with much higher differentials.

Taking the second quarter of the year as a basis and providing the industry as a whole can be kept at the level established during that period, total income will be at least as great as in 1942, and possibly about $3,000,000 higher. With the same price structure applying for the second half of the year, the annual income would be around $16,000,000 greater or approximately 10% up on 1942.

Allowing for the exchange premium on sales in the United States, the price of newsprint received by Canadian mills for the first two months of this year, worked out at $55 a ton. The first $4 a ton boost brought the price to $59.40 in Canadian funds, and this figure will apply until the end of August, and the final four months of the year Canadian newsprint mills will be receiving $63.80 a ton for newsprint sales in the United States. Prices for sales in Canada and to countries whose exchange is at par with Canadian funds, for the periods quoted above have been and are $50, $54 and $58 respectively.

Applying these prices to actual production and shipments in the first half of 1943, and extending the second quarter production over the last half of the year, would give an estimated gross income from newsprint of $175,000,000, against last year's total of approximately $172,000,000. Considering the new prices in relation to current production figures, for a complete year, would produce a total income from newsprint of approximately $187,000,000.

To the stockholder these are comforting speculations, but so much depends on actual production and shipment figures for the remaining months of the year. It is impossible to estimate what the increased revenues will mean to net profits.

Abitibi Shareholders Favor Reorganization

Abitibi Power and Paper Company, Ltd. committees from both the common and preferred shareholders, are now jointly seeking a reorganization plan which can be presented to the company's bondholders with a good chance of acceptance. Collaboration of the two committees in an endeavor to secure such a plan is said to arise from the recognition that the interests of common and preferred shareholders are largely identical and that, if a plan can be formulated acceptable to both, considerable progress may have been achieved on the road to ultimate reorganization.

Several plans have already been submitted to the committees by various financial groups, and meetings have been held to evaluate the various ways and means proposed. It is necessary to keep in mind a basis acceptable to equity holders in relation to current market quotations for their securities and the wide fluctuations in prices of these issues has been admittedly a problem in considering plans.

Income tax which would have to be paid by bondholders on accrued interest on Abitibi bonds may become an important factor holding up re-organization, it is intimated in some quarters. Some bondholders are said to be in favor of continuing on the present basis, without re-organization, until some later date, when income tax rates may be less onerous than at present. On the other hand, many bondholders have expressed a wish to see the company taken out of liquidation.

Rules on New Paper Board Grades

WASHINGTON, D. C., Aug. 4, 1943—Producers of paperboard east of the Rocky Mountains were reminded by the Office of Price Administration today to apply to OPA for approval of price ceilings for any new grades or qualities of paperboard.

Because so few applications have been filed for such approval, some producers apparently are not following these provisions of Revised Price Schedule No. 32 (Paperboard Sold East of the Rocky Mountains), OPA said.

Under this schedule, producers must secure OPA approval of any ceiling price not established by them during the base period, October 1, 1940, to October 15, 1941, or not specifically listed in the schedule.

Until approval of a maximum price is given, any sales at such prices are subject to adjustment retroactively by OPA. It is therefore to the best interest of the producer to get a new price approved at the earliest possible date. The schedule calls for submission of applications for price approval within ten days after the item has been manufactured. Forms are available from OPA, Washington, D. C.

Awards For Government Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., August 4, 1943 — R. P. Andrews Paper Company has been awarded the contract for furnishing the Government Printing Office with 10,000 pounds of smooth Dalton bond paper at 35 cents per pound. Other paper awards recently announced include the following:

Marquette Paper Company will furnish 191,000 pounds of groundwood book paper at 6 cents and the same firm will also furnish 500,000 pounds of white supercalendered book paper at 6.55 cents. Walker Goulard Plehn Company will furnish 2,160 pounds of 25% rag white bond paper at $236.95 and Magill-Weinsheimer Company will furnish 16,450 pounds of white marine offset paper at 8.75 cents per pound.

The Stanford Paper Company will furnish 6,000 pounds of white antique cover paper at 9.92 cents and Bulkley, Dunton & Company will furnish 28,700 pounds of chemical wood pink writing paper at 8.25 cents. The same firm will also furnish 145,000 pounds of white chemical wood writing paper at 8.75 cents. Bermingham & Prosser Company will furnish 145,000 pounds of same at 8.75 cents and North American Pulp & Paper Company will furnish 100,000 pounds same at 8.25 cents. Also Walker Goulard Plehn Company will furnish 70,000 pounds same at 8 cents.

Old Dominion Paper Company will furnish 19,968 pounds of white ground wood mimeograph paper at 5.349 cents; same firm will also furnish 100,000 pounds same at $5,349.00; and 256,500 pounds same will be furnished by the same company at 5.349 cents. Paper Corp. of U. S. will furnish 445,500 pounds of tan bristol cover paper at 9.75 cents.

D. L. Ward & Co. will furnish 7,717 pounds of white chemical wood ledger paper at 8.5 cents and the Cauthorne Paper Company will furnish 2,000 pounds of white stereotype molding paper at 14 cents. Stanford Paper Company will furnish 3,380 pounds of antique finish double thick cover paper at 5.72 cents and the R. P. Andrews Paper Company will furnish 220,000 pounds of sulphite tag board at 6.75 cents. Bulkley, Dunton & Co. will furnish 32,500 pounds of white offset book paper at 8.875 cents and the R. P. Andrews Paper Company will furnish 32,407 pounds of buff antique cover paper at 9.97 cents.

Marquette Paper Company will furnish 451,720 pounds of white chemical wood writing paper at 7.03 cents, and R. P. Andrews Paper Company will furnish 6,560 pounds of white antique cover paper at 10.18 cents. The same firm will also furnish 129,300 pounds of 50% rag, blue paper at 13.22 cents and the Stanford Paper Company will furnish 385,000 pounds of white litho chart paper at 15.1 cents. George La Monte & Son will furnish 16,500 sheets of green sensicoat postal card paper at $29.50 per cwt., and the Perkins-Goodwin Company will furnish 75,428 pounds of drumhead manila paper at 19.5 cents.

Bulkley, Dunton & Co. will furnish 105,000 pounds of chemical wood white index paper at 8.25 cents and Paper Corporation of, the U. S. will furnish 33,150 pounds of 50% rag, fawn index paper at 13.55 cents. Walker Goulard Plehn Company will furnish 51,200 pounds of 25% rag buff ledger paper at 14.76 cents and the North American Pulp and Paper Company will furnish 204,000 pounds of chemical wood white bond paper at 7.8 cents. The same firm will also furnish 63,000 pounds of white chemical wood index paper at 8.5 cents.

Paper Corporation of U. S. will furnish 95,500 pounds of tan bristol board at 9.65 cents and George La Monte & Son will furnish 120,000 pounds of sensicoat book paper at 22.75 cents. Barton, Duer & Koch Paper Company will furnish 180,000 pounds of 25% rag white bond paper at 13.25 cents and the R. P. Andrews Paper Company will furnish 49,000 pounds of 50% rag, white glazed manifold paper at 26.79 cents. Paper Corporation of the U. S. will also furnish 250,000 pounds of book paper at 7.2 cents and the same firm will also furnish 88,800 pounds of high finish sulphite manila tag board at 8.84 cents. Central Ohio Paper Company will furnish 116,000 pounds of white offset book paper at $7.79 cwt. and the Frank Parsons Paper Company will furnish 210,000 pounds of same at 9.26 cents.

Cauthorne Paper Company will furnish 30,000 pounds of 25% rag, yellow bond paper at 14.21 cents and the Marquette Paper Company will furnish 400,000 pounds of poster paper at 8 cents. Stanford Paper Company will furnish 151,700 pounds of semi antique whitag paper at 11 cents and the Marquette Paper Company will furnish 1,000,000 pounds of white sulphite writing paper at 7.3 cents. R. P. Andrews Paper Company will furnish 800,000 pounds of white supercalendered book paper at 7.24 cents.

R. P. Andrews Paper Company will furnish 40,000 pounds of oiled manila tympan paper at 9.75 cents and Barton, Duer & Koch Paper Company will furnish 6,000 pounds of white writing paper at 6.97 cents. Mid-States Gummed Paper Company will furnish 69,500 sheets of buff gummed paper at 1.34 cents and Barton, Duer & Koch Paper Company will furnish 50,000 pounds of white writing paper at 6.97 cents. Bulkley, Dunton & Company will furnish 32,000 pounds of chemical pink wood writing paper at 9.85 cents.

Crocker, Burbank Papers, Inc., will furnish 231,000 pounds of blue litho chart paper at $35.10 per M sheets and Bulkley, Dunton & Company will furnish 142,500 pounds of blue white aero litho chart paper at 17.75 cents. The same firm will also furnish 240,625 pounds of same at the same price.

Frank Parsons Paper Company will furnish 300,000 pounds of canary ground wood writing paper at 5.55 cents; 188,619 pounds same at 6.05 cents and 62,500 pounds of same at 6.46 cents. Graham Paper Company will furnish 100,000 pounds of white supercalendered book paper at 7.29 cents and Ditto, Inc., will furnish 18,000 pounds of Ditto Process B white paper at 10.9 cents; same firm will also furnish 180,000 pounds of same at the same price and the same firm will also furnish 110,000 pounds of same at same price. Whitaker Paper Company will furnish 60,000 pounds of lined box board at 6 cents.

Next time you're out in the mill, stop and watch the stock coming off the Bird Save-All couch roll and dropping into the machine chest. Visualize this stock as good, finished paper. The amount of it over a period makes a big difference in your total tonnage. What's more, you're getting it for next to nothing.

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Declares Pulpwood Cutting Essential

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., Aug. 4, 1943—Further clarification of the status of pulpwood cutting as an essential activity was made today in a letter addressed by the War Manpower Commission to A. G. Wakeman, Director of the Pulp and Paper Division of the War Production Board.

In view of the serious shortages of pulpwood and the manpower required to cut and ship this essential source of wood pulp for making paper, Mr. Wakeman expressed himself as pleased that the cutting of pulpwood is listed as essential in Selective Service Activity and Occupational Bulletin No. 27, as well as in an amendment to Selective Service Activity and Occupational Bulletin No. 7, and in Selective Service Local Board Memorandum No. 164.

These official documents should go a long way toward satisfying both the woodsman and the local selective service boards that this type of work—cutting of pulpwood, as well as the manufacture of pulp and certain kinds of paper therefrom—comes within the scope of essential activities, Mr. Wakeman declared. The whole pulp and paper industry, desperately in need of more pulpwood, is hopeful that more woodcutters will return to the woods and increase the production of essential pulpwood.

The letter, signed by William Haber for the Executive Director of WMC, Lawrence Appley, follows: "The purpose of this letter is to advise you regarding the essentiality of the cutting of pulpwood. The War Manpower Commission's Committee on Essential Activities has designated this activity as essential and will include it in the List and Index of Essential Activities when it is revised. The Index is distributed to all United States Employment Service offices.

"The regional directors of the War Manpower Commission have been informed of the inclusion of this activity and it will be subject to the provisions of the employment stabilization programs of the War Manpower Commission. The activity will also be specified in Selective Service Activity and Occupation Bulletin No. 7, Forestry, Logging, and Lumbering, which is made available to all local boards of the Selective Service System.

"You no doubt know that the cutting of wood, including pulpwood, is included among the essential farm products listed by the Selective Service in Local Board Memorandum No. 164 as a guide to the deferment of registrants engaged in agriculture.

"So far as the Selective Service classification of a registrant is concerned, it is primarily the responsibility of the local board to decide whether the specific establishment and the registrant's occupation therein are in support of the war effort. Therefore, for Selective Service purposes, interpretations of the bulletins and the manner in which they are applied in cases of specific activities or occupations are matters which come within the jurisdiction of the local board. Inclusion of an activity or occupation in a bulletin does not assure occupational deferment, nor does exclusion from a bulletin, except in the case of nondeferrable activities or occupations, preclude consideration for deferment from military service.

"Subject to the right of appeal, the classification of a registrant is determined on an individual basis by the local board upon consideration of all the evidence submitted. An employer filing a request for occupational deferment of a registrant must furnish all evidence necessary to classify the registrant including full information to support the claim that the activity or occupation in which the registrant is engaged is necessary to the support of the war effort."

WPB Restricts Some Paper Items

WASHINGTON, D. C., Aug. 4, 1943—The manufacture of a number of paper articles was forbidden and restriction in the tonnage permitted for many other converted paper products were ordered by the War Production Board today.

It is estimated by the WPB Pulp and Paper Division that amended Conservation Order M-241-a, which literally affects all use of paper and is far more inclusive in its scope than any other paper conversion order, will save between 250,000 and 300,000 tons of paper. The paper saved will be utilized to far better advantage in meeting the present exacting war requirements and certain civilian needs for paper and paper products.

Four lists forming a part of the order specifically name a great many paper products, which may be manufactured up to varied percentages of the 1942 rate of operation. These percentages range from a high of 110% to a low of 80%. However, there is also a list of products production of which is unlimited; those articles being ones which are either direct war products or highly essential to the civilian economy.

In addition to the restrictions on named products, the order also places a 30% production curtailment, effective October 1, 1943, on a vast number of other paper articles. Prior to that date, these articles are frozen at the rate of operation in effect during the first six months of 1943.

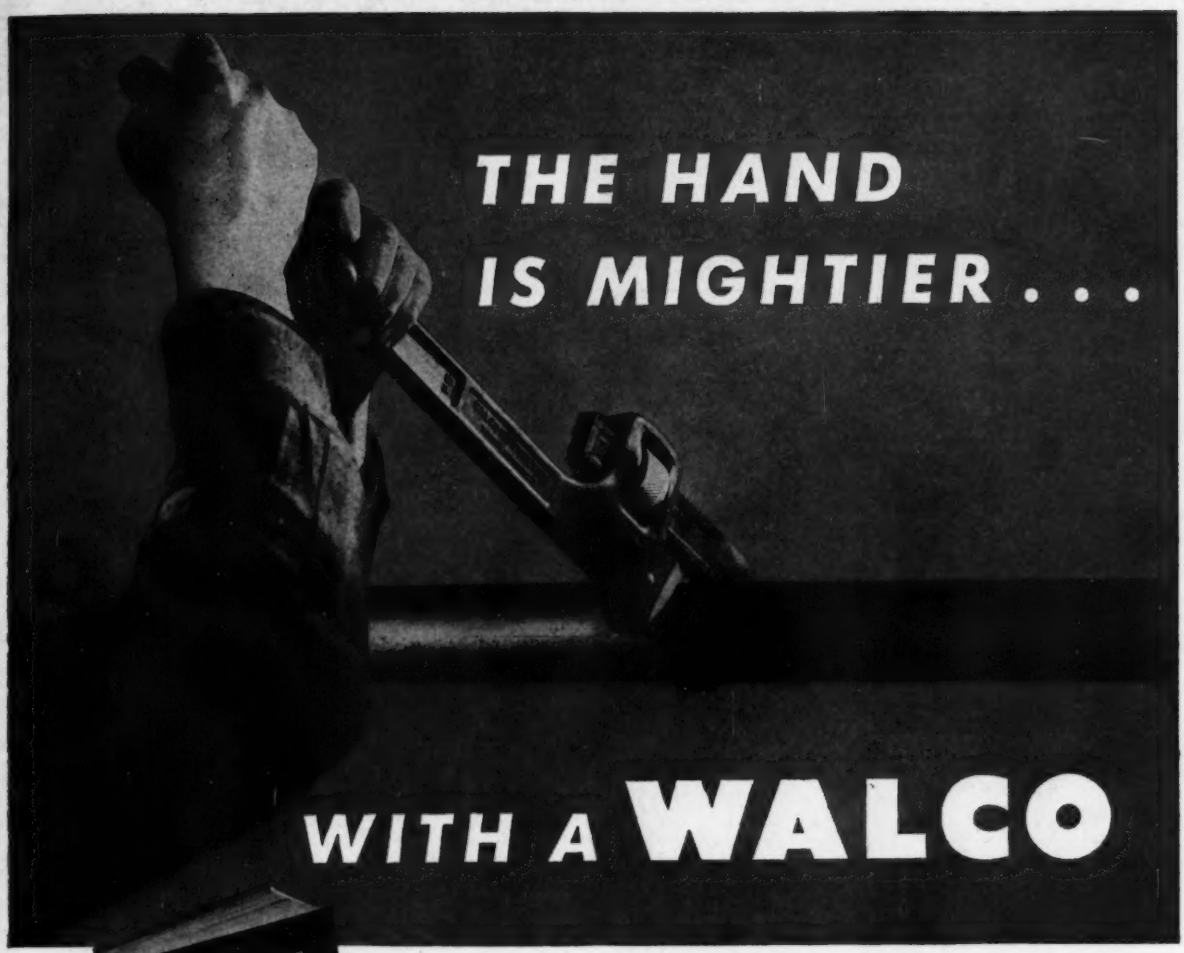
Among the unrestricted articles for military use which may be made of paper regardless of previous rates of production are the following: ration containers, balloons, bombs, camouflage paper, gas mask parts, gas protection capes and similar products, gun and rifle protective sleeves, helmets and accessories, hospital wadding and surgical bandages, parachutes, targets, and V-mail blanks for the Armed Services.

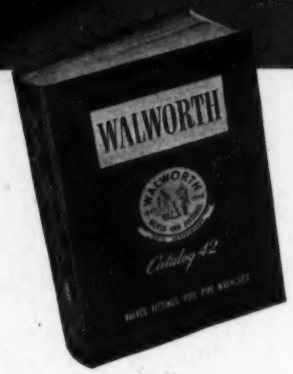
Unrestricted civilian paper products include abrasive paper, adding and business machine rolls, binder twines, carbon paper, fuses, gears, valves and gaskets, gummed tape, blue print, photographic and tracing papers, paper-base plastics and printing plates, sanitary napkins, shoes and parts, tabulating cards, and commercial and industrial tags.

Products intended chiefly for civilian consumption and use, which now may be manufactured at a rate of 100% of 1942 production include: artificial leather, buttons, envelopes, stationery, tablets, toilet tissue, sales tax tokens, shingles and waxed papers.

Other household and industrial products are set forth in a third list, and may be produced at a rate of 100% of 1942 production. They include dental pinafores, dishes, plates, forks, spoons, napkins, towels, facial tissues, fruit wrappers, hat and cap visors, light shades and reflectors, lunch boxes, photo mailers and mounts, soda straws, and window shades.

Only 80% of the products in a fourth list may be made after August 1, 1943, in proportion to the quantity manufactured in 1942. These include carpets, chair seats and covers, fly paper, games and toys, music rolls, mailing tubes, phonograph record albums, luggage, ribbons, slippers, tea bags, and venetian blinds.





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Every part of a Walco wrench is designed and built for strength and safety of operation. The Walco grips and holds no matter how hard you pull. All parts of this modern wrench are **made entirely of steel.** The handle and both jaws are made of drop forged steel. The housing and handle are forged from a single piece of steel. Both jaws are carefully machined, and all parts are heat treated to provide toughness, uniformity, and strength. The cross locked lower insert jaw, which is an exclusive Walco feature, makes it easy to remove a worn lower jaw and insert a new one. The spring may be quickly and easily replaced without the use of tools. These features prolong the life of the wrench indefinitely.

Users everywhere testify to the fact that Walco is the world's strongest wrench, the safest, and by far the least expensive to use. It is made by Walworth Company, manufacturers of valves and fittings for more than a century.

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending July 31, 1943

STOCKS

	High	Low	Last
A. P. W.	2⅜	2¼	2⅜
Armstrong Cork Co.	37½	34¼	34¾
Celotex Corp.	14¼	13	13
Celotex Corp., pf.	20	18⅛	18⅛
Certain-Teed Products Corp.	6⅜	6¼	6¼
Certain-Teed Products Corp., pf.	61	54½	54½
Champion Paper & Fibre Co.	22½	21	21
Champion Paper & Fibre Co., pf.	108	107½	108
Congoleum Nairn Co.	24½	21¾	21¾
Container Corp of America	23	19¼	19¾
Continental-Diamond Fibre Co.	14½	12½	12½
Crown-Zellerbach Co.	15½	14⅞	15
Crown-Zellerbach Co., pf.	97	95½	97
Dixie Cup Co.	15¾	14⅞	14⅞
Dixie Cup Co.,—A.	44	43	44
Flintkote Co.	21⅜	18⅜	18⅜
Flintkote Co., pf.	109	108	109
Robert Gair	3¼	3	3⅛
Robert Gair, pf.	13⅛	12¾	12¾
International Paper Co.	12¼	10⅞	11⅛
International Paper Co., pf.	62⅜	57	57½
Johns-Manville Corp.	86	80¾	81¼
Johns-Manville Corp., pf.	134	132	134
Kimberly-Clark Corp.	34	32½	32½
MacAndrews & Forbes	27	25½	26
MacAndrews & Forbes, pf.	133½	133½	133½
Masonite Corp.	41½	39	39
Mead Corp.	9½	8½	8½
Mead Corp., pf. A-6%	81	80	80¼
Mead Corp., pf. B-5½%	77½	74	74
Paraffine Companies, Inc	44½	42½	42½
Paraffine Companies, Inc., pf.	102	101¾	102
Rayonier, Inc.	15	13¾	13¾
Rayonier, Inc., pf.	30	29½	29⅞
Ruberoid Co.	27	24¾	25
Scott Paper Co.	42	42	42
Scott Paper Co., pf.,	113½	112¾	112¾
Sutherland Paper Co.	....	....	....
Union Bag & Paper Corp.	11¼	10	10
United Paperboard Co.	5⅛	4½	4½
U. S. Gypsum Co.	72½	68½	68⅝
U. S. Gypsum Co., pf.	178¼	177	177
West Virginia Pulp & Paper Co.	15½	14¾	14¾
West Virginia Pulp and Paper Co., pf.	106¼	106¼	106¼

BONDS

Abitibi Pulp & Paper Co. 5s '53	67	65½	65½
Celotex Corp. 4½s '47	101½	101	101½
Certain-Teed Products Corp. 5½s '48	100¼	99¾	100¼
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	107¼	107	107
International Paper Co. 5s '47	105⅛	105	105
Mead Corp. 3¾s '53	....	....	....
West Virginia Pulp & Paper Co. 3s '54	104	102½	103½

New York Curb Exchange

High, Low and Last for Week Ending July 31, 1943

STOCKS

American Box Board Co.	7⅞	7⅝	7⅝
Brown Co., pf.	....	....	....
Great Northern Paper Co.	34	33	33
Hummel-Ross Fibre Corp.	5	4⅝	4¾
National Container Corp.	14¾	13½	13½
St. Regis Paper Co.	4	3½	3½
St. Regis Paper Co., pf.	135	134	135
Taggart Corp.	4¼	4	4

BONDS

American Writing Paper Co. 6s '61	95	94½	95

Tomahawk Co. Holds Annual Meeting

APPLETON, Wis., Aug. 2, 1943—The Tomahawk Kraft Paper Company, Tomahawk, Wis., also held its annual meeting recently at Wausau, Wis., and reelected its officers and directors. They are: A. L. Kreutzer, Wausau, chairman of the board; S. B. Bugge, president and general manager; D. C. Everest, Wausau, first vice-president; J. H. Cowhill, Chicago, second vice-president, and H. L. Fitze, secretary-treasurer. Aytch P. Woodson, Wausau, Wis., was elected to the board of directors to succeed his father-in-law, the late C. C. Yawkey. The remaining directors are: Ben Alexander, Chicago, Ill.; F. K. McPherson, Wausau, and C. G. McLaren, Tomahawk, Wis.

Kimberly-Clark Nets 84 Cents

The Kimberly-Clark Corporation and subsidiaries, for the three months ended June 30, report sales of $11,426,464, compared with $10,974,390 preceding period and $10,660,413 year ago; net income $559,118 after taxes and charges, equal after preferred dividend to 84 cents a share on 488,173 common shares; preceding period $485,572 and 69 cents a share; year ago $484,358 and 69 cents a share; six months sales $22,400,854, compared with $18,747,795; net income $1,044,690, after taxes and charges, equal after preferred dividends to $1.53 a share; year ago $1,039,855 and $1.52 a share.

Container Corp. Nets 58 Cents

The Container Corporation of America for the June quarter reports consolidated net profit of $455,860, equal to 58 cents a share, compared with revised net of $523,191 or 67 cents a share for second quarter of 1942. Six months: Consolidated net profit, after $2,641,414 Federal income and excess profits taxes, was $833,219 or $1.06 a share, compared with revised net of $1,228,905 or $1.57 a share after $3,296,910 taxes for last year's period. Net sales for six months increased 2 per cent to $28,062,000 from $27,474,000 volume a year ago.

Gair Co. Earns 18 Cents

The Robert Gair Company and subsidiaries, for the three months ended June 30, reports a net income of $260,211 after taxes and charges, equal after preferred dividends to 18 cents a share on 1,133,822 common shares; preceding period $154,199 and 8 cents a share; year ago not available; six months' net income $414,410 after taxes and charges, equal after preferred to 27 cents a share; year ago $513,891 and 35 cents a share.

Filer Co. Nets 41 Cents

The Filer Fibre Company for the year to May 31, reports a net profit of $54,541, equal to 41 cents each on 133,265 shares, compared with $126,872, or 95 cents a share, in preceding fiscal year; net sales, $1,930,263, compared with $2,332,884.

National Gypsum Gains

The National Gypsum Company for the six months to June 30, reports net earnings of $442,658, equal to 22 cents a common share, against $401,053, or 19 cents a share, last year. Sales, less discounts, were $10,585,292, against $10,211,421.

Keyes Fibre Co. Earns Less

The Keyes Fibre Company for the six months to June 30, reports a net income of $150,909, against $167,022 net income last year.

Ruberoid Earnings Lower

The Ruberoid Company for the six months reports consolidated net profit, after $514,100 taxes and

$95,100 wartime contingencies, was $250,566, or 63 cents a share, against $268,146, or 67 cents a share last year; net sales, $12,472,201, compared with $13,745,089. June quarter consolidated net profit $102,204, or 26 cents a share, against $79,302, or 20 cents a share, in second quarter of 1942; net sales, $6,879,377, compared with $7,939,519.

Champion Nets $3.63

The Champion Paper and Fibre Company for the year to April 25, reports a net income of $2,532,212 after charges and taxes, equal after preferred dividend requirements to $3.63 each on the 500,000 shares of common stock outstanding, compared with $3,129,986, or $4.71 a share on the common stock for the year ended on April 26, 1942.

Mead Corp. Nets 45 Cents

The Mead Corporation for the twelve weeks to June 12, reports a net profit of $228,603, equal to 17 cents a share, compared with $381,115, or 45 cents a share, in the twelve weeks to June 13, 1942: twenty-four weeks to June 12: net income $479,777, equal to 38 cents a share, against $867,168, or $1.07 a share, in the twenty-four weeks to June 13, 1942.

Hinde-Dauch Profits Up

The Hinde & Dauch Paper Company and subsidiaries for the six months ended June 30, reports a net income of $510,693, after taxes and charges, equal after preferred dividends to $1.17 a share on 360,250 common shares; a year ago $453,621 and $101 a share.

Dennison Earnings Off

The Dennison Manufacturing Company for six months reports net sales were $8,472,000, against $8,398,000 in the 1942 period. Estimated earnings after taxes were $300,000, compared with a revised estimate of $310,000 for the first half of 1942.

A. W. P. Corp. Nets 28 Cents

American Writing Paper Corporation for the six months to June 30, reports a net profit of $101,650, or 26 cents a share, compared with $203,304, or 50 cents a share, last year.

United Paper Board Earns Less

The United Paperboard Company for the year ended May 29, 1943, net income $37,453; for previous year, net income $371,375.

Nekoosa-Edwards Nets $4.78

The Nekoosa-Edwards Paper Company for the six months to June 30, reports a net income of $301,117, equal to $4.78 each on 63,000 shares; net sales, $4,914,430.

Dixie Cup Earnings Up

The Dixie Cup Company for the twelve months to June 30, reports a net profit of $899,564, or $2.23 a common share, against $828,902, or $1.89 a share for preceding twelve months.

Detail of "O" seam, magnified about 7-3/4 times.

A Fourdrinier wire can be *only as good as it "seams"*. Precision workmanship, adequate equipment and a resolve to do a continuously better job have gone far to advance the technique of seaming wires. Lindsay puts forth every effort to devise a seam with drainage characteristics approaching those of woven cloth and yet not sacrifice strength or flexibility. We aim to make every seam sound, uniform, unvarying in construction. Many a seam has in it 20,000 metal-to-metal joints which must be finished with almost incredible accuracy... Will the achievement of tomorrow be as undreamed-of as today's reality was a decade ago?

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Serving the Paper Industry Since 1903
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Lindsay **WIRES**
FOR PAPER MILLS

WASTE LIQUOR PLANT STARTS

(Continued from page 9)

director of the WPA pulpwood and paper division, believes the manpower situation in Wisconsin and upper Michigan will be greatly relieved. Wisconsin mills expect to take part in the advertising campaign to induce farmers to cut and deliver pulpwood. They believe the contemplated cutting contest lasting from August through October with $3,500 worth of war bonds as prizes, will have a marked effect. Some of the Wisconsin mills already are carrying display advertising of their own for farm woodlot pulpwood, quoting the ceiling prices to be paid.

The United States Forest Service is cooperating by offering thousands of cords of pulpwood for sale under selective cutting. Latest announcements from the State Timber Marketing Committee at Madison, Wis., include stumpage in the Nicolet National Forest with headquarters at Rhinelander, Wis., and the Upper Pensinsula Experimental Forest at Dukes, Mich. A number of private owners also are offering stumpage on their woodlots. One of these is Mrs. Katherine Knisley, 2406 N. 64th street, Wauwatosa-13, Wis., who has 80 acres of timberland near New Lisbon, Wis., with 325 cords of jack pine, and 40 cords of jack pine and aspen mixed.

Mill Employment Shows Gain

Workers on the payrolls of Wisconsin mills and allied industries increased from 23,600 in May to 23,800 in June, a gain of 1%, according to reports of the Wisconsin Industrial Commission. Employment is up 1.3% from a year ago, when there were 24,100 wage earners. Payrolls are now 11.9% over June a year ago, a jump from $768,000 average per week to $860,000. They are 1.8% over May, when the weekly average was $844,000. Workers are receiving an average of 81.5 cents per hour for a week of 44.3 hours and an average pay check of $36.12 per week.

With carton materials becoming scarce and in some cases acute, the Milwaukee metropolitan area, largely in this field, underwent a slump from June over May, with 2,221 workers reported, a decline of 0.9%. Payrolls dropped in the same proportion to an average of $81,570 per week. Workers were putting in an average of 46.7 hours per week at a rate of 78.7 cents, or $36.73 per week.

Troy Made Good Salvage Record

[FROM OUR REGULAR CORRESPONDENT]

TROY, N. Y., Aug. 2, 1943—The Industrial Salvage Committee, of this city, has forwarded a report to the government showing that in the past month industries represented by the committee have collected another million pounds of industrial scrap to be turned back into the munitions of war. Since it was organized about a year ago the committee has accounted for 19,266,052 pounds of industrial scrap, a fact which was sent to the War Production Board. Among the scrap collected was 246,242 pounds of paper, rags and waste. Among the paper mills taking active part in the campaign are the Albia Box and Paper Company, Behr-Manning Corporation, Cohoes Envelope Company, John Leggett & Son, Inc., Mohawk Paper Mills, Inc., John A. Manning Paper Company, Noble & Wood Machine Company, Stevens & Thompson Paper Company, and others.

You Paper Mill Men • take a Tip on Kalamazoo Tile Stock Tanks and Chests • you can't beat them for STRENGTH and DURABILITY •

Kalamazoo Vitrified Glazed Tile

is a "Natural" for Paper Mill Needs—

Smooth, hard, strong, easily cleaned and highly resistant to chemical action, this marvelous vitrified glazed tile type of construction is preferred by scores of leading paper mill executives and engineers. Adaptable for stock tanks and chests of all kinds. Costs no more than concrete tanks that require constant maintenance expense.

An exclusive method of glazed tile tank construction developed by Kalamazoo engineers. It provides greater flexibility and lower cost for all paper mill stock handling problems. Immediately available.

● Any Size or Shape Desired—

Wide, narrow — shallow or deep. Round, rectangular or square. Half-round or tapered bottom and corners. Midfeathers and fins where needed to control stock flow. Adaptable to pumps or agitators. Construction individually designed to meet space, tonnage or production requirements.

Ask for engineering data.

Kalamazoo TANK & SILO CO.
KALAMAZOO - MICHIGAN

To Hold Chemical Show

Chemical industry already is consuming more than a billion dollars worth of allocated materials a year, almost wholly in war work, but the industry's leaders are constantly raising their sights. Many innovations will have been introduced by the end of the year, and the need for informing qualified personnel on critical phases of chemical progress is the principal basis for the 19th Exposition of Chemical Industries, to be held in Madison Square Garden, New York, December 6 to 11, next. It was inaugurated at the beginning of World War I, twenty-eight years ago.

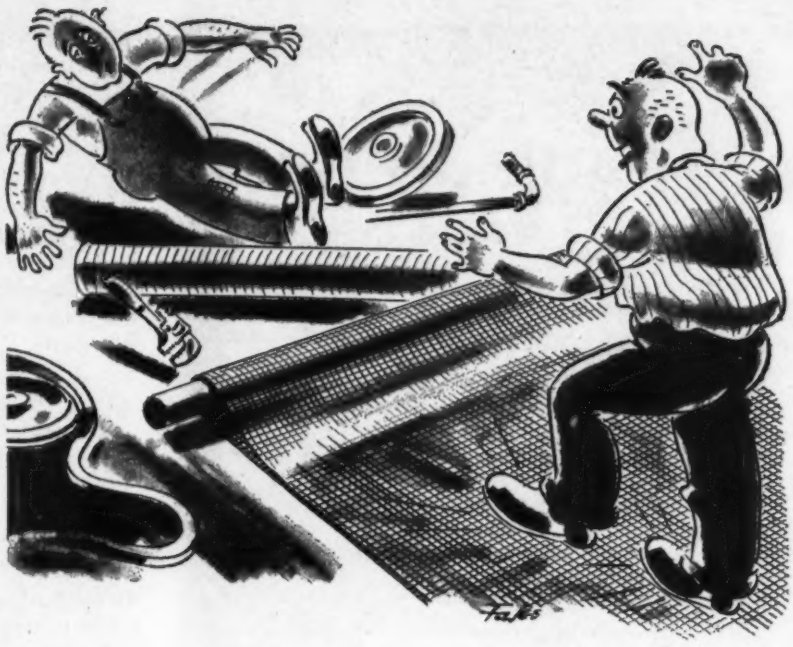
The importance of industrial chemicals and chemical engineering in war production is almost beyond appreciation. Several hundred chemicals and chemical processes are required to outfit a soldier for modern warfare. More than one thousand chemicals are required in the composition of a modern battleship. The war effort cannot be carried to a successful conclusion without improved materials, machinery and equipment.

It has been necessary to increase productive capacity for aluminum, magnesium, phenol, formaldehyde, methenol, toluene and many other basis products. The chemical industry was called upon to create and operate the new synthetic rubber industry, gearing it to produce 800,000 long tons the first year. High-octane gasoline is a new military requirement of undisclosed immensity. The inflation in explosives production taxes the imagination.

Construction of new plants, including expansion in metallurgical lines with chemicals and chemical products earmarked for war is estimated close to four billion dollars in all.

Charles F. Roth, manager of the exposition, in a statement relative to the greatly increased importance of this year's exposition, expressed his regret that no more space in Madison Square Garden is available to take care of applicants. There is already a sizeable waiting list.

The exposition will be open by invitation and registration only to visitors of rated occupational status. Attendance will include chemists, chemical engineers, researchers, plant superintendents, executives of industrial concerns, economic and financial consultants and others whose interests and work are directly in line with the purpose of the undertaking. No tickets will be sold and the general public is not admitted.



Oh now let us tell the story
of a bigger boner still,
At the changing of a wire
in a certain little mill.
All was ready when the tender
said, "Come here, son! Hold this higher!
So a new guy answered, "Yes sir!" and
walked right across the wire.
Well the tender fainted dead away,
the super's hair turned blue,
And the new guy *looped* to grab his coat
as out the door he flew.

Wires are made of scarce materials by skilled craftsmen . . . they deserve extra care now. You'll find that your Cheney Bigelow wartime wires properly handled, will deliver all the fine service you've come to expect of them . . . because we're keeping our skilled craftsmen on the job. Though we're now producing many war items, we're also going right on with development and manufacture of Fourdrinier wires and other mill equipment; with full government approval, for paper, too, is a weapon.

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PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Henry J. Berger

EDITOR

Vol. 117 August 5, 1943 No. 6

COMING EVENTS IN PAPER INDUSTRY

Technical Association of the Pulp and Paper Industry, Fall Meeting, Palmer House, Chicago, September 21-24, 1943.

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

MANPOWER AND WAGES

A definite trend to that final victory for which we are fighting appears unmistakable now. Despite the continued success of Allied offense operations and the notable record of all branches of the United States armed forces on many fronts, we are warned that the situation must not be viewed with complacency. The war is being won but many battles must yet be fought until our enemies will accept our terms of unconditional surrender. The outlook is bright but in the interim civilian business and everyday living problems become increasingly difficult and burdensome. Manpower is one of the most serious problems with which business has to deal. From current estimates of manpower requirements for defense production, it seems inevitable that more labor must be diverted from almost all civilian enterprises.

In analyzing manpower requirements the current issue of The Guaranty Survey, published July 27 by the Guaranty Trust Company of New York, states in part: "Revised estimates of manpower requirements, made public early this month, are believed to indicate that geographical transfers of workers may become necessary on a larger scale than has been generally expected. It is anticipated that 3.6 million additional persons will have to be recruited; 2.0 million for the armed forces and 1.6 million for war industries. These additions will bring the total strength of the armed services to 11.3 million by July, 1944, and will raise the number employed in war industry to 11.6 million. The estimated increases in the strength of the armed forces takes no account of the number that may have to be withdrawn from the civilian population for replacements in order to maintain the number of men in uniform at the maximum figure. In industries serving civilian needs, the increases in requirements for workers in some divisions are expected to be more than offset by declines in others. As a result, a net decline of 2,250,000 persons employed in these industries during the next twelve months is anticipated. In agriculture, the food industries, textiles, clothing and leather products, labor requirements are expected to remain virtually unchanged. Decreases in employment will, it is believed, be concentrated largely in trade, service industries, construction and building materials, and to some extent in miscellaneous manufacturing industries and governmental agencies not directly related to the war effort."

In enumerating some of the steps to meet manpower needs The Survey points out that, "It is reported that the War Manpower Commission will soon withdraw its lists of essential occupations in war industries from the Selective Service Bureau and replace them with much shorter lists of 'critical' occupations. The plan is based on the fact that the list of essential occupations has lost some of its significance because most workers listed as eligible for deferment have been and are being replaced by those not subject to conscription and because many of the occupations designated as essential have been broken down into several parts, so that unskilled or partly trained workers can handle much of the work formerly done by skilled operatives. It has been announced also that manpower regulations will be changed to permit workers to transfer to jobs with higher pay in essential war industries in cases where the employee's pay is less than the minimum going rates established by the National War Labor Board. This step toward partial wage standardization is designed to prevent dissatisfaction leading to labor turnover and agitation for wage increases."

In discussing the most important phases of the steps being taken in wage regulation, The Survey goes on to say that, "The National War Labor Board has inaugurated a plan to put workers in war industries on a flexible standardized wage basis, with scales based on the principle of equal pay for jobs of equal skill . . . Proposals for wage incentive programs on an industry-wide basis, by which it was hoped to stimulate labor productivity, also have been found impracticable and have been discarded by the War Production Board. . . . The only incentive plans found to be operating successfully are those worked out in detail to meet the individual requirements of small plants or departments. The program will, accordingly, be limited henceforth to efforts to gain the support of managements for wage incentives in plants where higher pay is deemed desirable and where other means of increasing output have proved ineffective. An opinion that is believed to preclude any immediate prospect of a general and substantial wage increase for non-operating railway employees was filed by the Director of Economic Stabilization early this month. It states that the wage increase recommended

by the Emergency Board selected from the National Railway Labor Panel was disapproved because it was based upon an alleged 'gross inequity' shown by a comparison of railway wage rates in other industries."

In view of this decision it appears that wage increases in all other types of industries and trades are not likely to be approved in general. THE SURVEY states that, "Such a comparison in the Director's opinion, is not relevant under the President's 'hold the line order' and the directive issued by the Economic Stabilization Director in May. To conform with those orders, wage increases may be granted only to correct substandards of living to allow a 15% increase over the level in January, 1941, in accordance with the 'Little Steel formula,' to provide merit increases if costs are thereby raised, and to bring wages into line with tested going rates."

Nekoosa-Edwards Reelects Officers

APPLETON, Wis., Aug. 2, 1943—Officers and directors were reelected by the Nekoosa-Edwards Paper Company at a meeting July 21 at the company's main offices at Port Edwards, Wis., as follows: John E. Alexander, president and general manager; Guy O. Babcock, vice-president; C. A. Jasperson, secretary-treasurer, and Harry Deyo, assistant secretary; directors, L. M. Hanks, Madison, Wis.; A. S. Puelicher, Milwaukee, Wis.; Judson Rosebush, Appleton, Wis., and J. B. Nash, Wisconsin Rapids, Wis. Mr. Alexander gave a report on 1942 operations and for the first six months of this year, as well as commenting on the production conditions to be faced under tightening restrictions.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1943		Corresponding Weeks—1942	
June 19	87.0	June 20	86.5
June 26	88.1	June 27	84.5
July 3	85.6	July 4	67.6
July 10	67.1	July 11	69.7
(Holiday July 4)		July 18	81.5
July 17	87.6	July 25	79.2
July 24	*90.5*		

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1942	104.5	103.9	102.9	100.4	95.3	87.4	75.8
1943	87.2	88.9	89.5	88.7	91.5	*85.7*	

Year	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1942	80.8	82.8	90.6	86.9	80.1	90.4
1943	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1936	1937	1938	1939	1940	1941	1942	1943
Year to Date	77.7	87.9	67.6	78.6	86.9	93.4	95.7	*88.1*
Year Average	80.4	79.8	71.5	83.4	85.6	97.4	90.4	...

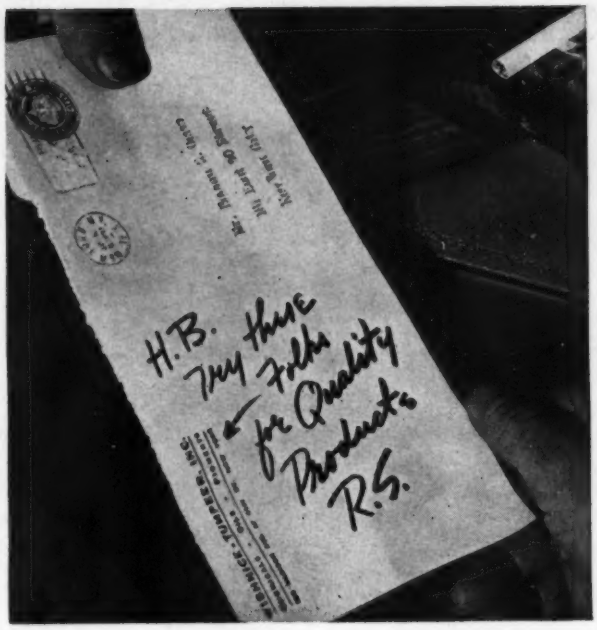
* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Avg. Year
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	88	94	94	96	*94*	..	..	..	..	..	..	..

Week ending June 19, 1943—95 Week ending July 10, 1943—69
Week ending June 26, 1943—96 Week ending July 17, 1943—91
Week ending July 3, 1943—92 Week ending July 24, 1943—*97*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.



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A trial will convince you that Witco Black No. 11 is not only easier to use but more economical than the uncompressed blacks generally employed in paper making. It is a pellet type black especially produced for use in paper . . . cleaner . . . more easily incorporated into the beater and dispersed throughout the pulp. It will save you considerable time and expense because of these advantages. Our staff will gladly assist you in using Witco Black No. 11 in your black papers. Write for samples and further information.

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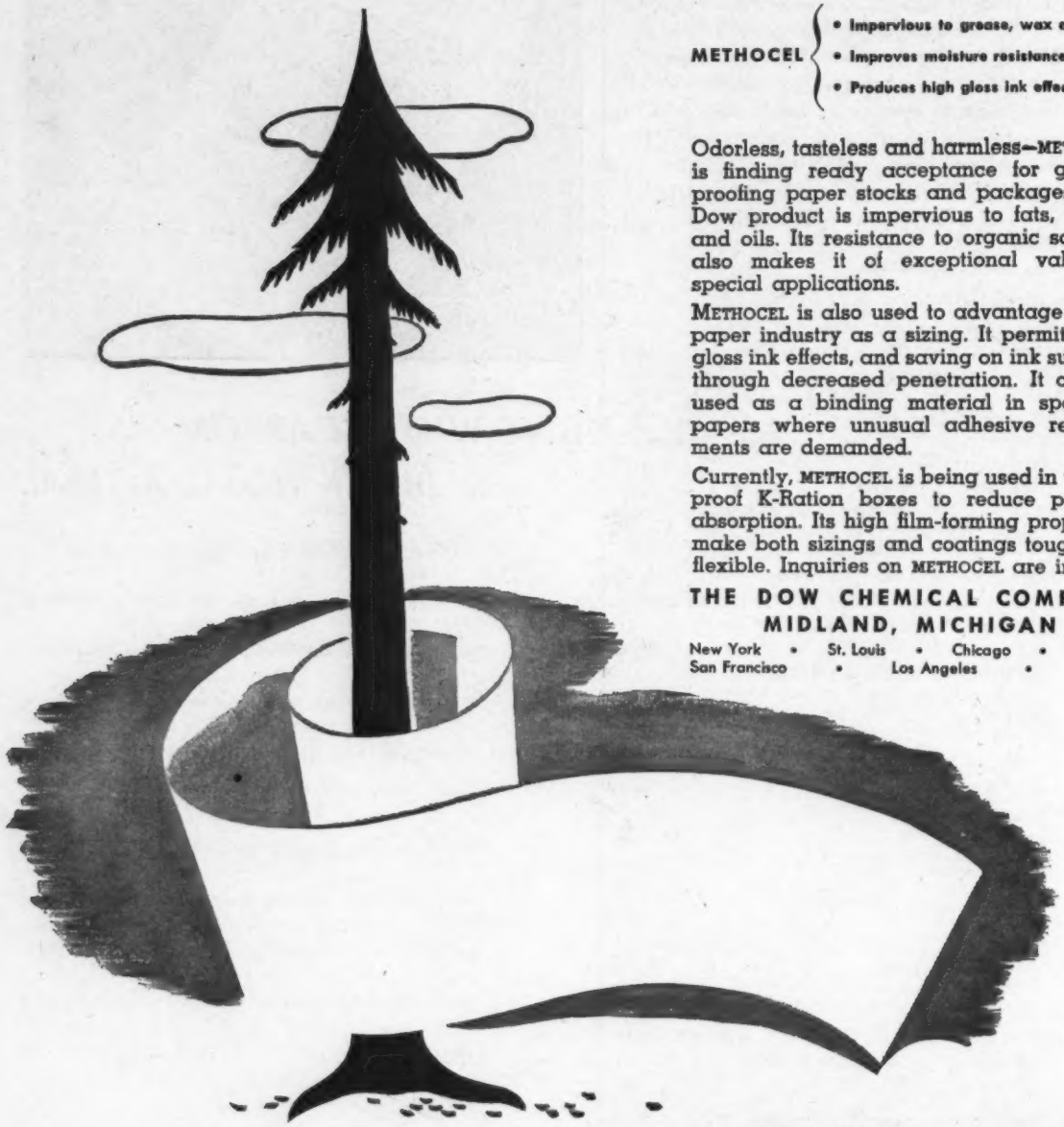

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- Improves moisture resistance
- Produces high gloss ink effects

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Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY

Edited by R. G. Macdonald, Secretary

Troublesome Compounds and Reactions of Sulphur Encountered in the Sulphite Process—II

By C. F. B. Stevens[1]

Abstract

The effect of varying burner gas composition on the formation of active sulphur and sulphur trioxide was investigated: also the aging of the acid so made. Evidence was found of the presence of an organic SO_2 compound in the pulp giving reactions for active sulphur, and apparatus was devised for its differential analysis on a semimicro- and a microscale. It was concluded that, once elementary sulphur is eliminated, SO_2 residues are mainly responsible for active sulphur in paper.

In a previous paper *(6)* some account was given of the undesirable side reactions which sulphur enters into during the course of the sulphite process. The following represents a further pursuit, with improved methods and equipment, of the vagaries of this somewhat elusive element, the purpose being to clear up the causes of the presence of active sulphur in finished paper. The term "active sulphur" is here taken to mean all compounds of sulphur which are reduced to hydrogen sulphide in the TAPPI standard and similar tests. It therefore includes sulphite, bisulphite, thiosulphite, polythionate, elementary sulphur, and organic-SO_2 compounds.

I. Acid Plant

The investigation was begun by finding the effect of varying burner gas composition upon the formation of active sulphur and of sulphur trioxide. Samples of gas, cooler drip, and acid, at burner gas concentrations of 13, 15, and 17% SO_2, were taken and analyzed.

A. Gas

After the acid plant had been run at full speed at the desired SO_2 percentage for 15 minutes, a 2-liter gas sample was taken *(6)*. The sodium hydroxide solution of the gas was washed out into a 250 ml. volumetric flask, made up to the mark, and analyzed as follows:

1. *Active Sulphur excluding SO_2:* To 100 ml. of the above solution were added 10 ml. conc. HCl. The solution was evaporated to 5 ml. to drive off SO_2, cooled, and washed into the flask of the sulphur-testing apparatus. A new form of the latter is shown in Fig. 1. The water-bath (1) heats a round-bottomed 500 ml. flask (2), equipped with three 29/42 standard taper necks. One of the latter carries a vent (3) and an HCl funnel (4); the center neck carries the paper clamp (5), and the third a buret (6). The buret is used to measure in standard sodium thiosulphite solution when making up standard stains, and may be replaced by a stopper when testing unknowns. The detail of the paper clamp (5) is shown in Fig. 2. A sintered glass filter (1) serves instead of a cotton wool plug; (2) is a 29/42 standard taper joint. The drilled plastic bottle-cap (6) fits over the short upper flanged tube (5) and engages the threads fused on to the flange (3), thus clamping the circle of lead acetate paper (4) between the flanges.

Four 1 cm. squares of sulphur-free aluminum were added to the flask and the apparatus set up. Five milliliters of conc. HCl were then run in, the flask was swirled and placed on the steam bath for 1 hour. The test paper was then air-dried and compared with standards made by similarly testing known amounts of standard $Na_2S_2O_3$ solution (0.000010 grams of sulphur per ml.).

2. *Sulphur Trioxide:* Determined gravimetrically on 100 ml. of the above solution *(6)*. A new form of wash bottle which will not introduce sulphate ion or other impurities is shown in Fig. 3. It consists of a 1-liter Florence flask (1), with a cap connected by a 24/40 standard taper joint (2); (3) is the vent controlled by the thumb; and (4) the bulb for supplying pressure. Neoprene tubing is used to connect the nozzle. Thus the hot water touches nothing but glass and neoprene, and does not pick up sulphur as it will from ordinary rubber.

B. Drip from Coolers

Half an hour after the start of the gas sampling, a 1-liter beaker was held under each of the four drips for 20 seconds apiece. The samples were poured into a 2-liter sealer jar, well mixed and their aggregate volume measured.

1. *Active Sulphur:* Not determined.

2. *Sulphur Trioxide:* One milliliter of the above sample was pipetted into 50 ml. of water, and 10

[1] Fraser Companies Limited, Edmundston, N. B.; Present Address: 493 Argyle Ave., Westmount, Que.

ml. of conc. HCl added. The solution was evaporated to 20 ml. and treated as in A2 above.

C. Strong Raw Acid (System Acid)

Forty-five minutes after the start of the gas sampling a 1-liter sample was taken, in a sealer jar, from the line connecting the towers to the settling tank.

1. *Active Sulphur:* To 10 ml. of the acid were added 10 ml. of conc. HCl. The solution was evaporated to 2 ml. and tested as in A1 above.

D. Limerock

This was found to be a secondary source of active sulphur and was tested as follows: representative chips from 15 rocks per car were ground to a fine powder. Of this 0.25 gram was placed in the flask of the apparatus shown in Fig. 1 and tested as in A1 above.

Results are given in Tables I to III and Figs. 4 to 6.

The concentration of active sulphur in gas and acid decreases with decreasing percentage of SO_2 in the gas. Not all of the active sulphur in the gas is absorbed in the acid—some of it goes out with the escape gas. On the other hand, the limerock introduces a certain amount which constitutes the minimum for the active sulphur content of the acid. In

TABLE I.—ACTIVE SULPHUR AND SULPHUR TRIOXIDE IN GAS, DRIP, AND ACID

	Gas Composition, % SO_2			
	13%	15%	17%	
S as Active S in Gas	0.000008	0.000009	0.000042	g./l.
S as Active S in Acid, Total	0.0008	0.0012	0.0016	
S as Active S in Acid, due to Limerock	0.0005	0.0005	0.0005	
S as SO_3 in Gas	0.00826	0.00718	0.00338	
S as SO_3 in Drip	6.05	1.38	0.88	g./sec.
S as SO_3 in Acid	0.332	0.236	0.151	g./l.

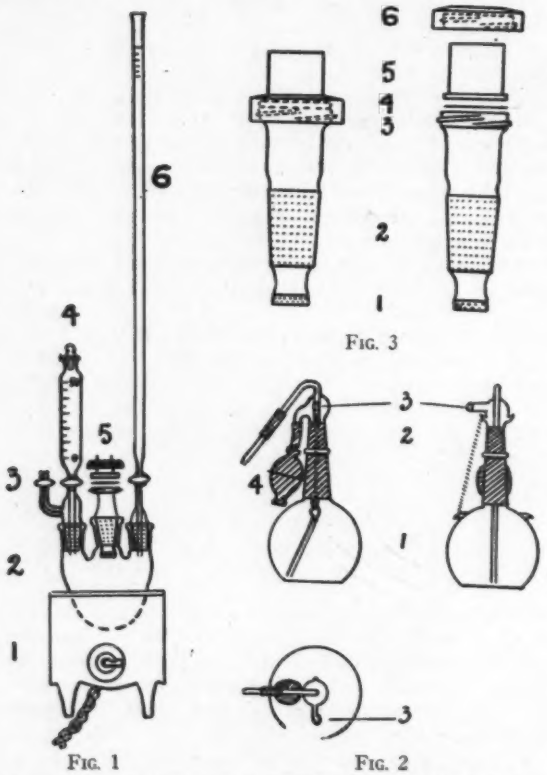

Fig. 3

Fig. 1 Fig. 2

Fig. 1—Modified Apparatus for TAPPI Sulphur Determination. Fig. 2—Detail of Lead Acetate Paper Clamp. Fig. 3—Glass-and-Neoprene Wash Bottle.

TABLE II.—AMOUNT OF SULPHUR BURNED TO SO_3, EXPRESSED AS A PERCENTAGE OF THE TOTAL AMOUNT BURNED

	Gas Composition, % SO_2			
	13%	15%	17%	
Rate of Burning Sulphur, Approx.	18,000	20,000	22,000	lb./shift
S as SO_3, % of Total S burned				
In Gas	4.17	3.18	1.34%	
In Drip	2.13	0.47	0.26	
Total	6.30	3.65	1.60%	

TABLE III.—ACTIVE SULPHUR IN ACID, AVERAGE OF SEVERAL RUNS

Date		Gas Composition, % SO_2 13%	15%	17%	Active S due to Limerock	
4/8	S as Active S	0.0010	0.0015	0.0040	0.0010	g./l.
4/9	S as Active S	0.0008	0.0019	0.0026	0.0007	
15/9	S as Active S	0.0008	0.0012	0.0016	0.0005	
Av.	S as Active S	0.0009	0.0015	0.0027	0.0007	g./l.

Table III, results obtained on three different days are given. Factors other than the SO_2 percentage, such as rate of burning and fan speed, also influence the active sulphur concentration *(6)*, and will not be exactly the same for each test; 0.0040 g./1. produced a noticeable extra turbidity in the acid—the system was actually pulling sulphur. The limit of tolerance should be about 0.0020 g./1.

The concentrations of SO_3 in gas, drip, and acid all increase with decreasing percentage of SO_2 in the gas. Decreasing the latter therefore reduces the formation of active sulphur but increases that of SO_3, causing much waste. (A large part of this waste runs out in the drip and is likely to be overlooked.) Raising the percentage of SO_2, on the other hand, diminishes the waste due to SO_3; but it increases the concentration of the active sulphur to a degree determined by the capacity and design of the sulphur-burning plant. A point is eventually reached where enough active sulphur is formed to cause trouble in the finished pulp. Mill experience indicates that if the TAPPI standard is adhered to, this point is considerably short of the deposition of sulphur in the gas lines.

II. Acid Storage Tanks

The final step in the investigation of the raw acid was to determine whether or not it changed in composition upon being allowed to stand. The samples of acid taken for the series of tests described above were allowed to stand in sealed jars for a week. They were periodically opened, shaken, and tested for SO_3 and active sulphur by the above procedures. While this method limited the access of oxygen, it was chosen as most nearly approximating mill conditions, where the acid is in contact with an atmosphere not of air but of more or less concentrated gas.

The results are given in Tables IV and V.

TABLE IV.—CONCENTRATION OF ACTIVE SULPHUR IN ACID ALLOWED TO STAND

Days after Making	S as Active S: In Acid from 13% Gas	In Acid from 15% Gas	In Acid from 17% Gas	
0	0.0008	0.0012	0.0016	g./l.
2	0.0005	0.0008	.....	
5	0.0008	0.0011	0.0013	
6	0.0012	0.0013	0.0019	
7	0.0004	0.0006	0.0008	

TABLE V.—CONCENTRATION OF SO_3 IN ACID ALLOWED TO STAND

Days after Making	S as SO_3: In Acid from 13% Gas	In Acid from 15% Gas	In Acid from 17% Gas	
0	0.321	0.236	0.151	g./l.
2	0.396	0.388	0.302	
5	0.513	0.508	0.389	
7	0.635	0.612	0.546	

The concentration of the SO_3 increases on standing due to the oxidation of some of the SO_2. The concentrations of active sulphur found are irregular due to the difficulty of drawing off a representative portion from the sludgy sample but indicate that no increase in active sulphur takes place.

While the acid is in the settling and storage tanks the percentage of SO_3 therefore increases slightly (some of this removes itself from the acid by precipating as $CaSO_4$) *(6)*. Under ordinary conditions, however, the acid takes but 8 to 10 hours to go from the acid plant to the digesters, during which time the SO_3 will increase by only about 10% of its original value. The concentration of the active sulphur will actually decrease, due to settling out of sulphur particles *(6)*. For the purpose of this investigation, therefore, the aging of the acid may be disregarded. It may be noted in passing, however, that if a weekly composite sample of acid is collected for an SO_3 determination, the results will be worthless unless the acid has been stabilized against oxidation from the first by the addition of, say, brucine sulphate. Also that if the sludge in the bottom of the storage tanks is disturbed while acid is passing through, a slug of sulphur-bearing material will be carried through into the pulp.

III. Digester House

After the foregoing results were obtained, care was taken to keep the SO_3 percentage in the gas from going too high, and the situation was found to be improved. Occasional positive tests for active sulphur in the pulp and paper were obtained in spite of this, however, and it became evident that other factors must be involved which did not concern the acid plant. The investigation was therefore carried on into the digester house.

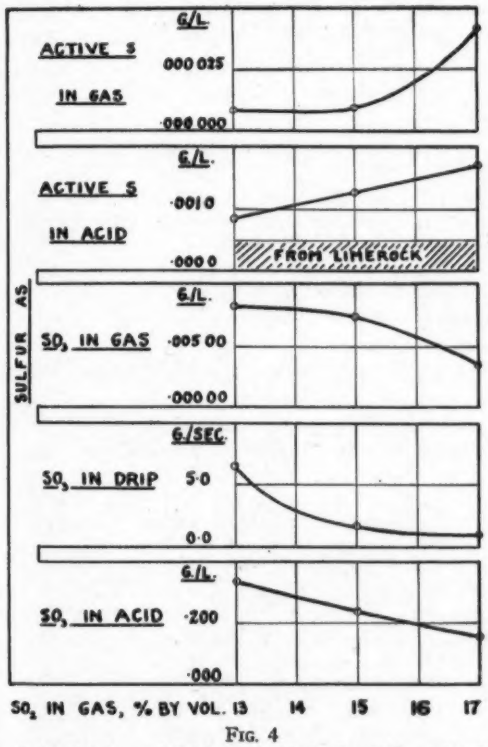

FIG. 4

Active Sulphur and Sulphur Trioxide in Gas, Drip, and Acid

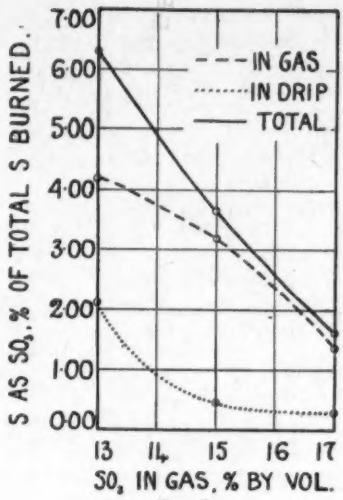

FIG. 5

Percentage of Sulphur Burned to Trioxide

A. TAPPI Standard Test

It was at first thought that information could be obtained by applying the TAPPI standard test to the cooking liquor after evaporation with HCl, as was done with the raw acid. Samples were taken at hourly intervals, beginning at the fourth hour of the cook. Results are given in Table VI.

TABLE VI

Hours after Start of Cook	S as Active Sulphur	
	Run 1	Run 2
4	0.00022	0.00021%
5	0.00027	0.00027
6	0.0004	0.0007
7	0.0015	0.0009
8	0.0022	0.0019
9	0.0040	0.0040
10	0.0060	0.0060
11	0.0060	0.0070

Now it is improbable in the extreme that as much as 0.01% of elemental sulphur should be present in the blow-liquor. In fact the figures run suspiciously parallel to the amounts of lignin present in the cooking liquor at the different stages of the cook *(4, 5)*, and point to the probability that organic matter is interfering with the test by preventing the complete expulsion of SO_2 during the preliminary evaporation with HCl. In other words, it appears that a part at least of the lignosulphonic acid, known to be present, is not completely decomposed by HCl, but is later reduced by nascent hydrogen to H_2S during the test itself.

B. Elemental Sulphur by Extraction

The next operation, therefore, was to prove this by analyzing the liquor for elementary sulphur by a method with which lignosulphonic acid would not interfere. Preliminary purification of reagents was found necessary to obtain a small enough blank for this semimicro determination. Laboratory distilled water was redistilled from potassium permanganate in an all-glass apparatus, and was used from the special wash bottle shown in Fig. 3. The carbon disulphide was redistilled in an all-glass still, once over mercury to remove sulphides, and once over calcium chloride to remove water.

A large sample of cooking liquor was taken from a digester just before it was blown. Part was tested immediately for active sulphur by the method used

in the previous section. Several hundred milliliters of the remainder were evaporated to dryness with care, and the residue ground in a mortar. About 10 grams of this were placed in a Whatman paper thimble lined with a 12.5 cm. No. 42 filter, and extracted with 100 ml. freshly purified CS_2 for 8 hours in an Underwriters' extractor, to dissolve out elementary sulphur. The extract was filtered through a No. 3 Jena fritted glass filter to remove paper fibers. Ten milliliters of 3:2 carbon tetrachloride: bromine water mixture and 15 ml. of conc. nitric acid were added to oxidize elemental sulphur. 0.1 gram NaCl was also added, to provide a non-volatile cation and thus prevent subsequent loss of SO_3. The solution was then evaporated to dryness and ignited to remove any organic matter. The residue was drenched with 50 ml. of hot 10% HCl and filtered. Five ml. of hot 10% $BaCl_2$ solution were added and the $BaSO_4$ determined in the usual way.

A ground and dried sample of digester deposit was similarly analyzed. Results are given in Table VII.

TABLE VII

Sample	Elementary S by CS_2 Extraction	Active S by TAPPI Method
Blow Liquor (10% solids).....	0.000009	0.012%
Digester Deposit	0.00015	....

The amount of elemental sulphur actually present in the blow liquor is at least a thousand times too small to be responsible for the result of the active sulphur determination by the TAPPI method. The cause of the latter therefore appears to be in fact the organic complex specified above. Now it is probable that some of this complex will be found in the pulp after cooking, and that, if so, some of it may remain there after washing and cause the finished pulp to give a positive test for sulphur. This possibility will be investigated further in Section D. In the meantime it will be recalled that sulphide, if present, would not have been included in the TAPPI active sulphur test as conducted in Section A. The presence of this compound was therefore next tested for.

C. S as Sulphide

An improved form of the original apparatus is shown in Fig. 6. For this test the absorption unit is disconnected at (8) and the paper clamp (Fig. 2) substituted. A 1-gram sample was placed in flask (7) with 150 ml. hot water. Ten milliliters conc.

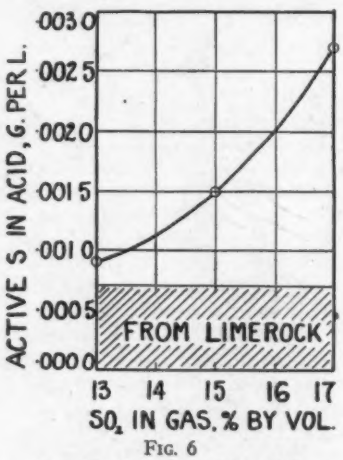

FIG. 6
Average Active Sulphur in Acid

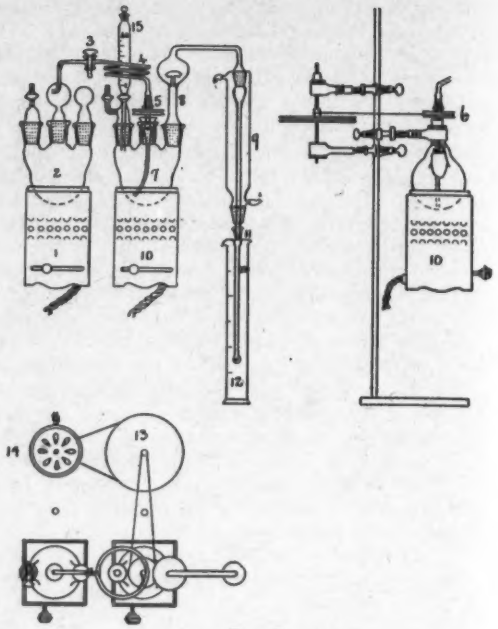

FIG. 7
Semimicro Apparatus for Differential Analysis

HCl were added and the whole heated to boiling. Steam from flask (2) was bubbled gently through. (CO_2 and the apparatus shown in Fig. 7 may be used instead.) Thus sulphide present was decomposed to H_2S which the steam carried up to the lead acetate paper. Samples were tested of digester deposit, dried blow liquor, unwashed blow stock, and washed blow stock which had been kept for two weeks in a closed jar.

Results are given in Table VIII.

TABLE VIII

Sample	S as Sulphide
Digester Deposit	0.0000%
Blow Liquor	0.0000
Unwashed Blow Stock	0.0000
Washed Blow Stock after standing two weeks in a closed jar	0.0012

Sulphide sulphur is therefore not present in digester deposit, blow liquor, or fresh pulp. The sulphide found in the sample of old pulp was probably the result of bacterial decomposition of SO_2 or SO_3 compounds in the pulp *(3)*, as the latter had acquired a slight mouldy smell.

D. Differential Analysis

It was found in the conclusion to Section B that the presence of an organic SO_2 compound in the pulp would have to be considered. That calcium lignosulphonate is actually present in unbleached pulp has been shown by Klason *(4)*. There are, however, two other forms of active sulphur which may also be present, retained in the pulp—calcium sulphite and sulphur dioxide. To obtain accurate information as to the relative amounts and subsequent histories of these three forms, it was necessary to devise some means of analyzing a sample of pulp for each one separately. This method is described below.

The all-glass apparatus shown in Fig. 7 was constructed with standard taper ground-glass joints to avoid contamination of the small quantities of SO_2 and H_2S to be handled. Fifty milliliters of water were placed in cylinder (12) followed by 10 ml. of

TABLE IX

Compound Sought	Volume of Distillate, ml.		S as Compound Sought, gram	
SO_2	(1)	100	0.00136	
	(2)	100	0.00041	
	(3)	100	0.00019	
	(4)	100	0.00004	
		400		0.00200
$CaSO_3$	(1)	100	0.00029	
	(2)	100	0.00009	
	(3)	100	0.00013	
	(4)	100	0.00009	
		400		0.00060
Organic SO_2 Compounds	(1)	100	0.00026	
	(2)	100	0.00004	
	(3)	100	0.00001	
	(4)	100	0.00001	
		400		0.00032
Total				0.00292

Br_2 water from a Tamworth syringe pipet. A one gram sample of the pulp in 200 ml. hot water was placed in the flask (7) and brought to the boiling point. Steam from the flask (2) was then admitted to the pulp and the stirrer motor started, to facilitate the disengagement of SO_2. The latter was carried along to the condenser, where the steam condensed and dissolved it, washing it down into the bromine water where it was oxidized to sulphate. When a predetermined volume of distillate had been collected, this cylinder was removed and another, continuing the same amount of bromine and water, put in its place. When the evolution of this free SO_2 was considered complete, 10 ml. of conc. HCl were run into the sample, thereby releasing SO_2 from the $CaSO_3$. This was distilled off with steam and oxidized as before. When this operation was complete, one gram of aluminum sheet was added to the sample. This, with HCl already present, generated hydrogen which reduced organic-SO_2 compounds to H_2S. The latter passed off and was oxidized in the same manner as the SO_2. The solutions thus obtained were all evaporated to 10 ml. and transferred to 15 ml. beakers. 0.1 ml. of conc. HCl and 1 ml. of hot 10% $BaCl_2$ solution were added. The solution was boiled and allowed to stand overnight. The precipitate was filtered off on a 10 ml. Gooch crucible, washed, ignited and weighed. Redistilled water from the glass-and-

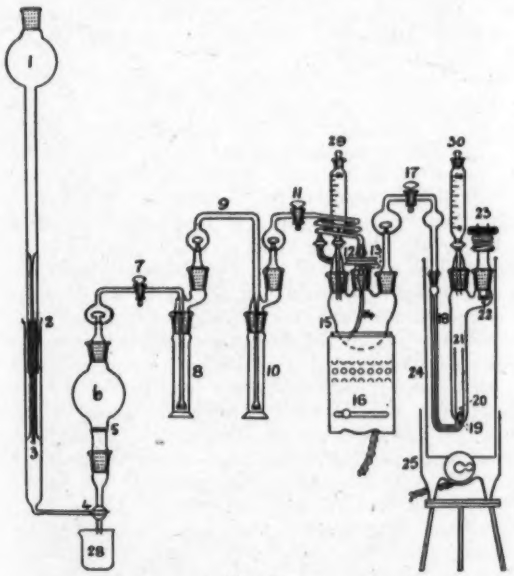

FIG. 8
Micro Apparatus for Differential Analysis

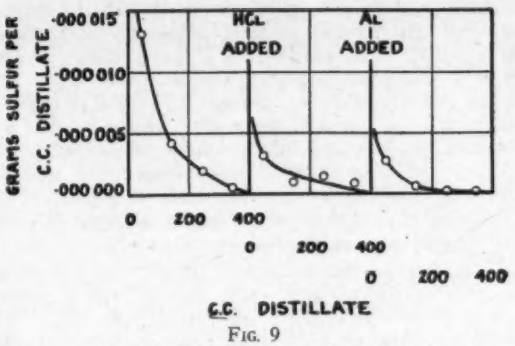

FIG. 9
Analysis of Sulphur Compounds in Pulp

neoprene washbottle was used throughout.

Proof of apparatus:

Blank, SO_2 equivalent	0.00008 g.
SO_2 in 0.1000 g. $CaSO_3.2H_2O$, by above method	0.0463
Ditto, by direct iodine titration	0.0464

A blow sample of pulp was pressed, without washing, at 100 p.s.i. for 1 minute. A 1-gram moisture-free portion was tested for SO_2, $CaSO_3$, and organic SO_2 compounds—four 100-ml. distillates for each compound sought. Results are given in Table IX and Fig. 9.

The existence of these three forms of active sulphur is clearly shown in Fig. 9. Their relative amounts would be expected to depend on many factors, including the composition of the cooking liquor and the way in which the cooking was done. Because, however, the total amount found here is about a hundred times as much as a strongly positive test by the TAPPI method, it appears that all three forms must be very considerably removed during the subsequent washing. It therefore seemed most feasible to leave the problem of cooking liquor equilibria and first find out which compound was ultimately responsible for the presence of active sulphur in the paper. To do this it was necessary to devise some means of extending the range of the method used in this section.

IV. Paper

A. Micro Differential Analysis of Active Sulphur

In this section is presented a method by which these three forms of active sulphur may be distinguished upon a scale at least as small as that of the TAPPI test. The apparatus, shown in Fig. 8, was set up and operated in the manner described.

The lower part of the sliding joint (2) was first clamped securely. The upper part was then inserted and suspended by a clamp on the reservoir (1). Stopcock (4) was closed, and 1:1 phosphoric acid was poured into (1) until the lower end of tube (3) was well immersed. Mercury was then poured into the outside of the joint to within an inch of the top, sealing the joint so that (1) could be filled up. The height of (1), and hence the pressure under which the CO_2 was generated, could then be varied over a range corresponding to about two-thirds the length of the joint. The generating vessel (6) contained lumps of fused Na_2CO_3 which rested on the fused-in fritted glass filter (5). The gas washing bottle (8) held saturated $KMnO_4$ to remove H_2S, and a second one (10), distilled water. The stirrer (14) was fitted into a cut-down thermometer adapter (13) placed in the center neck of flask (15), and was motor driven as shown in Fig. 7. Small aluminum

helices were packed in the inner tube (21) of the reductor (18), followed by 2 ml. of a solution containing 10% $FeCl_3$ and 10% $AlCl_3.6H_2O$ to serve as activator, and hot water sufficient to cover the upper end of the tube. Funnel (30) was fitted and made fast by springs, as was connected tube and stopcock (17). Paper clamp (23) was provided with a circle of lead acetate paper and fitted without springs. The whole was then lowered into the copper water bath (24), (17) meshing with flask (15), and held by a clamp on funnel (30).

A 1-gram sample of paper was torn up and disintegrated in 100 ml. hot water in a 250-ml. Berzelius beaker by a high-speed motor stirrer, placed in flask (15) and brought to boiling. Funnel (29) was inserted, and CO_2 passed through the flask at a rate of 1 to 2 bubbles per second, via the stirrer tube. Five milliliters of 1:1 HCl were then admitted to the aluminum from funnel (30) and the generation of hydrogen begun. The CO_2, bearing with it the disengaged SO_2, passed into the reductor through nozzle (20). This caused suction at the holes (19) so that liquid entered there, was carried up the inner tube over the helices, and was discharged over the top into the outer tube again, thus keeping the acid circulating over the aluminum. The SO_2 was catalytically reduced at the surface of the helices, and the H_2S so formed was determined by the lead acetate paper. When all the free SO_2 had been brought through, a fresh paper was clamped in (23) and 50 ml. of 1:1 HCl were run in from funnel (29). This released SO_2 from $CaSO_3$, which was carried through and determined as before. When the evolution of this SO_2 was complete, the reductor unit was disconnected and washed, and the stirrer motor stopped. One gram of aluminum sheet was then added to flask (15), and the paper clamp fitted to this flask. Active organic SO_2 compounds (plus elemental S, if any) were thereby reduced, producing H_2S which registered on the lead acetate paper. The different stains were then compared with standards made as follows:

A buret was placed in the left-hand neck of flask (15) in the place of funnel (29); 150 ml. of hot water and 50 ml. of 1:1 HCl were placed in the flask and heated to boiling, while 5 ml. of 1:1 HCl were run into the reductor. The stirrer and the CO_2 were turned on. When the flask had been swept free of air, standard $CaSO_3$ solution (0.000005 gram sulphur per ml.), stabilized with brucine sulphate, was run in to produce the standard stain required. This turned out to be about double the depth that the same amount of sulphur would have given by the TAPPI test.

NOTES

1. CO_2 is used here, instead of steam as in the semimicro apparatus, because it gives a positive displacement of gas in the system without condensing on the paper and washing out the stain.

2. After several runs, when the H_3PO_4 in (6) becomes weak, stopcock (7) is closed and (4) is opened to waste, and the spent acid runs out into beaker (28).

3. Five milliliters of HCl should be added to the reductor every 15 minutes while it is running.

4. *Purification of HCl:* 250 ml. of 1:1 HCl are placed in flask (15), and CO_2 is bubbled through until no more stain is given on the lead acetate paper. This acid is then bottled and used as required.

5. The ground joints should be under compression wherever possible by springs or rubber bands. The stationary joints are wetted with water before setting up: the moving joints are lubricated with cellogrease.

Apparatus blank: 0.0000005 gram sulphur.

The results obtained by testing a sample of rejected paper are given in Table X.

TABLE X

Sample	Compound Sought	S as Compound Sought
Rotogravure paper giving a positive TAPPI test	SO_2	0.0005%
	$CaSO_3$	0.0007
	Organic SO_2 compounds (+ S)	0.0005
	Total	0.0017

The results indicate that no one form of active sulphur predominates; the amounts found are the washed-out residues of the active sulphur present in the blowpit stock. The remedy appears to lie, once elemental sulphur is eliminated, in strict adherence to the cooking curves followed by a more thorough washing *(1, 2, 7)*.

Acknowledgment

Acknowledgment is made to Fraser Companies Limited, for their kind permission to publish this paper.

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F. E. Harrell Made Chief Engineer

Fred E. Harrell, assistant chief engineer of the Reliance Electric & Engineering Company since 1934, has been appointed chief engineer of the company, effective August 1, it is announced by Clarence L. Collens, president.

For the past ten months Mr. Harrell has been acting as executive director of a new marine division plant for Reliance. This special assignment has been carried out with such marked success that this third Reliance plant is now well into volume production of special-purpose electric motors for the Navy and Merchant Marine, according to A. M. MacCutcheon, engineering vice-president of Reliance.

A native of Logansport, Ind., Mr. Harrell came to Reliance in 1924 upon graduation in electrical engineering from Purdue University. In 1927 he was transferred from sales engineering in the company's Chicago office to general engineering in Cleveland.

A fellow of the American Institute of Electrical Engineers, Mr. Harrell is also the chairman of the Institute's Committee on Electrical Machinery and a past chairman of the Cleveland section of the Institute. Mr. Harrell is a civilian member of the American Society of Naval Engineers and a member of the Cleveland Engineering Society. He belongs to Pi Kappa Phi, social fraternity, and to two national honorary engineering fraternities, Tau Beta Pi and Eta Kappa Nu.

Nonfibrous Raw Materials Report—1942*

By E. N. Poor[1]

The nonfibrous raw materials report is submitted annually by the Nonfibrous Raw Materials Committee of the Technical Association of the Pulp and Paper Industry.

The past year witnessed marked changes in the production and distribution of pulp and paper products, as brought about by pulp allocation, simplification of grades, labor shortage, regulations on transportation, ceiling prices, and a general diversion to military needs. Perhaps the most vital and lasting change in the industry, as effected by the shortage of critical materials, was at least a partial realization of the essentiality of paper. This has become evident particularly, in the packaging field where paper has seemingly found a permanent place.

The changes in the industry were necessarily reflected in the use of nonfibrous materials. Certain chemicals, such as titanium dioxide, critical at the beginning of the year, became available, limited principally by transportation facilities. Others, such as glycerin, became increasingly critical. In general the supplies of nonfibrous materials varied with the immediate military demands.

Salt Cake

The supply of salt cake (sodium sulphate) was adequate for domestic use. There were no changes in price or quality to any extent.

Sodium Hydroxide

At present the pulp and paper manufacturers using sodium hydroxide (caustic soda) are not having any difficulty in obtaining their normal requirements. They have been able to obtain the caustic soda largely because during the past year a few new war industries have resulted in an increased production of this commodity. However, there has been and probably will continue to be an increased use of caustic, especially in the munitions industry. We do not believe that this will become acute, but, as you know, the situation may change at any time.

We do not know of any substitutes which can be used in the paper industry to replace caustic soda. Some of the silicates and phosphates might be substituted for part of the caustic soda, but these are also very hard to obtain.

The increased use of paper products by the Federal Government and the Armed Forces, especially paper cartons used to package food stuffs and munitions, should tend to increase the use of caustic soda. This trend should be somewhat offset by the fact that serious curtailment of many types of paper products have been ordered by the Government. It would seem logical that many companies would increase their use of waste papers, principally due to the difficulties of obtaining shipments of fresh pulp. The latter, as you know, is due to the lack of sufficient shipping facilities.

Despite the fact that there has been an increased demand for caustic during the past year, there has been very little change in the price of this commodity. Certainly the manufacturers of caustic have not sacrificed their high standards of quality and do not intend to do so.

Lime

General increases in the price of lime developed during 1942, a part of which was due to the increase in freight rates; also a 3% Federal tax on freight that became effective on December 1st. Barring some unusual development, prices on lime will be firm during 1943 with very small surplus lime tonnage available.

The Office of Defense Transportation has ordered lime in bulk to be loaded at a minimum of 40 tons, and packaged lime, at a minimum heavier than previously, we urge all regular consumers of lime to carry heavier stocks than usual, as it is not always possible to get cars suitable for loading lime on short notice, and as the shipments of war material to our fighting fronts extend, the shortage of suitable railroad equipment for the shipping of lime will increase.

Early in 1943, new war plants will start operations that are going to consume large quantities of lime. In spite of the fact that the war program has increased the lime tonnage considerably in the past year and a half, and will increase it next year by many thousands of tons, the lime manufacturers have sufficient equipment in the country to take care of the additional lime tonnage necessary to carry our war program.

Soda Ash

Soda ash (sodium carbonate) consumption during the past year was characterized by increasing demands from the chemical, glass and paper industries. The midyear transition period of many civilian goods manufacturers to war industries reduced demand, but the trend at the close of the year is definitely upwards; however, sufficient material is available.

It is probable that the increasing use of soda ash in bauxite purification, in glass and in the manufacture of synthetic organic chemicals will maintain alkali plant operation at maximum capacity. Additional ash capacity coming into operation during 1943 may partially relieve the situation, especially in the South.

Soda ash continues to be the cheapest and most readily used form of alkali in pulp manufacture, however, limited quantities of liquid caustic soda have substituted for soda ash in some pulp mills where inadequate causticizing equipment has impeded pulp production increase.

No new uses involving a substantial increase in soda ash consumption have developed in the pulp industry. Due to forced curtailment in the paper industry, it is probable that the total soda ash tonnage used for soda recovery makeup, sulphidity control and salt cake replacement will be less in 1943 than heretofore.

No change in soda ash quality has occurred due to wartime conditions, and the uniform purity of this commodity will undoubtedly be maintained. Soda

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ash prices for 1943 levels, despite substantial increases in alkali manufacturing cost. Some difficulty may be experienced in 1943 due to the slow delivery by the carriers, and it would be well to schedule orders of soda ash well ahead of the necessary delivery dates to offset transportation delays.

Sulphur Dioxide

We think there is good reason for expecting that the industry's requirements of liquid sulphur dioxide will be furnished during the coming year. This belief is based on the assumption that the producers of liquid sulphur dioxide will be able to get what they need to operate their plants and that increased demand under preference priorities will not amount to so much as to affect seriously the distribution of the product, and that shipping equipment which the manufacturers are using or on which they are expecting to get delivery will not be diverted to other products.

The question of containers, of course, is an important one to be considered when compressed gases are involved. However, the indications are that a sufficient number will be available for normal requirements of the industry.

As indicaed in the previous paragraph, there appears to be no need at this time to look for substitutes for liquid sulphur dioxide, which in fact may itself be employed to replace certain materials not now available.

No industry data are available, as far as I know. However, there probably has been little change in the consumption of liquid sulphur dioxide by pulp and paper mills when comparing this year with 1941. There is no question on the other hand, but that the consumption for 1942 would have been considerably greater than for 1941 if chlorine were still available in unlimited quantities. There are several mills where bleaching of kraft pulp was anticipated and expensive plants erected for this purpose; due to the curtailment in the quantity of chlorine available, however, these mills have not commenced bleaching operations as scheduled.

There has been no change in the price of liquid sulphur dioxide during the past two or three years. It is not expected that war conditions will affect the quality of liquid sulphur dioxide.

In addition to its use in connection with bleaching processes and for the fortification of cooking acid. Liquid sulphur dioxide is now being employed in certain cases to replace alum where this latter chemical has been used for pH control. We understand that alum is difficult to obtain at the present time, at least in certain areas, and the ability of liquid sulphur dioxide to replace this material is one of its inherent advantages.

Alum and Sodium Aluminate

The WPB order restricting the use of imported and Arkansas high-grade bauxite to the manufacture of aluminum, high octane gasoline and abrasives has resulted in some radical changes during the past six months in the quality and availability of the aluminum salts used by the paper industry.

Most of the commercial alum used in the paper industry was made from the now restricted high-grade bauxite. Existing alum production processes involved a settling and mud washing cycle which resulted in an essentially insoluble free alum with a minimum alumina loss. Therefore, alum production has been upset due to the change to a nonrestricted bauxite of lower alumina content and four or five times more insoluble. The government order restricting the use of bauxite and most of the experimentation has had to be carried out on large scale plant production. The result has been that production capacities have not been maintained at the former high level.

The alum produced has contained much of the insoluble matter present in the bauxite with consequent lower alumina content. The variations in the quality of the bauxite and the fact that considerable experimentation was necessary to set up satisfactory control on the process has resulted in the production of alum which has varied in alumina and insoluble content.

There has, however, been a gradual improvement in the alum produced from low grade bauxite during the past five months both in regard to quality and quantity. The government order requiring the shipping of double v cars instead of single ones aggravated the availability of commercial alum to the paper industry at a time when alum production capacities were low.

Alum production and quality should continue to improve during the coming year and there should be sufficient commercial alum to satisfy the needs of the paper industry.

A shift from aluminum hydrate to low grade bauxite as the raw material for iron-free alum has presented some real problems to the manufacturer. However, a limited quantity of iron-free alum is being produced commercially now and before the end of 1943 should be produced in sufficient quantity to supply the needs of the paper industry. Various grades of aluminum sulfate have been substituted for iron-free alum when it has not been available.

The consumption of commercial and iron-free alum up to the time production was curtailed was about normal and no new uses developed to affect availability. There were no changes in the price of either during the past year.

The manufacture of sodium aluminate for the paper industry has been seriously affected also by the restriction on the use of bauxite and aluminum hydrate. There is an indication that the WPB may allocate aluminum hydrate for the manufacture of sodium aluminate for use in the production of some essential papers but there is no definite ruling to this effect and each mill must obtain its own allocation from the WPB.

The manufacture of sodium aluminate from the unrestricted raw materials presents many difficulties that have not yet been overcome. We know of no commercial production of a high strength, low insoluble and low iron content sodium aluminate that is stable in solution such as that commonly used by the paper industry. Although a crude sodium aluminate high in insoluble content and unstable in solution might be suitable in some cases there are many others where it would not be.

As long as sodium aluminate was available the consumption and price were equivalent to the previous year and no new uses developed to affect its availability to the paper industry. A possible substitute for sodium aluminate in producing a sized paper at a high pH is to use an alkali and an excess of alum.

Rosin

Thus far rosin stands in a class by itself in that there has been an oversupply. This condition has applied up to the present moment, as latest available reports indicate that stocks have increased through

1942. It is expected that shortage of labor, trucks, tires, etc., will cause a material reduction in production during 1943, but it is not apparent yet that production will fall materially below demand and even if such is the case, the reserve supplies built up in 1942 and carried over from previous years should be more than ample.

While no adequate substitute is available, there seems little need for one due to the large existing supplies and the probability that production will continue to supply at least a large proportion of consuming needs.

As to change in consumption of rosin in the paper industry during 1942, there may have been some trend toward the use of more rosin in the sizing containers. Reduced production of some kinds of paper appears to have resulted in a reduced overall consumption of rosin. This trend will probably continue during 1943.

Government support through a loan program maintained a fairly firm price trend during 1942 and is expected to continue to do so in 1943. In fact, higher loan values which are in effect for 1943 should result in a generally higher price level. At the time this was being written, no ceiling prices were in effect on gum rosin. Ceilings cannot be lower than parity, on agricultural products, and as market prices were materially below current parity prices during 1942, it is very possible for the general level to average higher in 1943 than was the case last year.

Gum rosin is an agricultural commodity made by countless small producers and, therefore, is of itself subject to any major improvement in the quality of the production in the aggregate, even though Government agencies have not entirely neglected experimental work toward that end. The greatest opportunity appears to lie in improvements in the use of rosin.

While gum rosin is a cheap basic source of organic acid, little success has been achieved at finding new uses, other than those uses which have been known in past years. As far as is known now, only small quantities are likely to be diverted into new channels during 1943 and such new uses will have very little effect on the supply situation or the price trend.

Sulphur

There is very little can be said that is new about sulphur this year in the paper industry. In general, however, it is an outstanding achievement of the industry that it has been able to keep pace with greatly expanded demand caused by the intense industrial effort of the war. This is particularly true in the supplying of sulphur for sulphuric acid. Larger quantities of sulphuric acid are being used by the oil refining industry in the manufacture of high octane gasoline and very substantial quantities of acid are being used in the manufacture of explosives.

There are ample stocks of sulphur above ground available for prompt shipment. Production is on a level with shipments, which are the highest in the history of the American sulphur industry.

The consumption of sulphur during 1942 was the greatest in the history of the industry. However production was maintained on a level with shipments.

There has been no change in the base price of sulphur during the past four years. The quality remains the same.

No new uses for sulphur in the paper industry have been reported. The consumption of sulphur in the kraft mills has increased.

Sodium Silicate

There are now ample supplies of raw materials for the manufacture of sodium silicate, and there are no conditions indicated which should appreciably change this picture. It seems likely that the supply of sodium silicate during the coming year will be in reasonable excess of anticipated demand so that no shortage of silicate or need for substitute material is likely.

During the past year, the consumption of silicate of soda roughly parallelled the general business trend and consumption of this commodity declined only slightly from the peak 1941 figure.

Prices for the various grades of sodium silicate continued very stable during the past year and similar stability is anticipated for the coming period.

Uniform demand for this product during the past year permitted full continuance of routine plant controls and maintenance of the usual standards of product quality.

No important new uses for silicate of soda in the paper mill industry were developed during 1942. However, silicate of soda has always been readily available and a low priced alkaline material, finding use in practically all industries. As a result, its use has expanded in certain established uses and has been introduced into some new ones. Outstanding has been the development of certain uses for silicate of soda in gel form and to satisfy this demand, considerable increased consumption seems likely during the next year. However, the silicate industry should be able to supply this demand comfortably.

Starch

Our armed forces are drawing heavily on all corn processors. This, along with lease lend requirements, is creating a tight situation in the supplies of starch available for other purposes. The probability is that this trend will increase during 1943 so that a tighter situation can be expected in the future.

No change in price is expected during the coming year and there should be no reduction in the quality of starches offered to the paper industry.

It is impossible to make reliable predictions under these uncertain conditions, but all indications are that less starch will be available for nonmilitary use during 1943. However, every effort will be made to keep paper mills supplied with the essential quantity of starch.

A considerable amount of work has been done trying to find satisfactory substitutes for various starch products used in the paper industry. As yet complete substitution with satisfactory amounts of raw materials available has not been approached. For certain specific uses satisfactory substitutes have been found.

Glue

With the curtailment in production of many civilian items, in which animal glue has been a factor, it now appears, enough animal glue is available to satisfy all essential requirements.

Hide glue and raw materials from which it is made, are included in price schedules, issued by the Office of Price Administration and in all probability, animal glue prices will not change during the year, unless a general increase in labor and materials costs, necessitate modifying present price schedules.

The demand for animal glue by the paper industry continues to increase (consumption now substantially over that of normal years) primarily, due to items requiring animal glue, being introduced by changing

war conditions. Curtailment in other fields has provided glue enough to take care of these new developments and with further anticipated changes in both directions, it appears that animal glue will be available in sufficient quantities to satisfy the needs of the paper industry in a very satisfactory manner. It is expected, animal glue production will continue at the present volume and consumers will not be obliged to seek substitutes and may depend upon the standard of quality being maintained.

Titanium Pigments

For the coming year the outlook as regards "titanium" pigments is that the demand will be considerably less than the supply. We cannot foresee any governmental restrictions which would limit our production to a point where we could not supply the full demand, nor do we expect any type of allocation. The only probable effect war conditions could have on the availability of titanium to the paper industry would be one of transportation, which as you know is in the hands of the various agencies in Washington.

The consumption of titanium pigments in the paper industry in 1942 was somewhat less than in 1941, the principal factor causing this decrease in demand being the brightness ceiling placed on some of the products of your industry by WPB. The overall consumption of titanium as an opacifier—particularly in opaque bread wrap, etc., has continued throughout the year at a normal rate.

There has been no change in the price of titanium pigments in 1942; and inasmuch as we are expecting operating under an OPA price schedule, any variation in prices in the coming year will be entirely in the hands of the Office of Price Administration.

There has been no change in the quality of the pigments in the past year, and we do not expect any variations in the quality in 1943. It has not been necessary for us to in any way reduce quality of our products because of any shortage in chlorine.

We do not know of any new uses developed for titanium pigments in the paper industry, unless you consider the opacifying of light paper for the issuance of government orders, etc., as falling in such a classification. Titanium of course could be and is being used for producing brightness in paper due to the shortage of chlorine.

The titanium ore, formerly from India, is now available from domestic sources.

Zinc Sulphide Pigments

The war is having a definite effect upon the markets served by zinc sulphide pigments, and there has been a great demand on them for numerous products connected with the prosecution of the war. Due to these demands it is impossible to say at this time what tonnage of zinc sulphide pigment will be used in the paper products.

Clay

Clays from England have come forward during the past year in sufficient tonnages to keep all the trade well supplied and as far as 1943 is concerned conditions look favorable for a continuance of these clays.

Consumption of domestic clays continued to increase. Prices have held steady and indications are that they will remain the same for the coming year of 1943.

Dyestuffs

The war economy has forced a considerable curtailment in the production of civilian materials requiring dyes and has eased the supply situation materially. The demand for dyes for paper has been considerably less in 1942 than in the previous year and sufficient quantities are now available to amply supply present requirements. As it seems likely that further restrictions may be imposed on civilian materials, there should be no shortage during the coming year if necessary raw materials are available to the dyestuff manufacturers.

The raw materials situation is difficult to predict because it must be remembered that dyes are manufactured from coal tar crudes and other highly critical materials which may become more scarce as time goes on. It is believed however that sufficient of the essential raw materials will be available to the dyestuff manufacturers to permit the manufacture of enough dyestuffs to supply the essential requirements of the paper industry.

It is possible that certain dyes may not be available but there is such variety of dyes and pigments manufactured that it is fairly positive that satisfactory substitutes will be available. However, each case where a substitution is necessary will be a problem in itself and will have to be worked out as the situation arises.

The consumption of dyes for paper has been considerably less this year than in 1941 because of the smaller demand.

Ceiling prices for March, 1942, are still in effect. In general, standards have been maintained even though producers have had difficulty obtaining some raw materials. In the few industries that changes were necessary, consumers were advised and the new standards found to be satisfactory in quality.

Twenty-five years ago we were dependent on Europe for dyes and organic chemicals. The industry was born because of the desperate need for those products which could no longer be imported. Men with vision supplied the capital and plants were built. From a slow beginning through many tribulations because of lack of knowledge and skill, the present organic chemical industry came into being. Its first products left much to be desired. In a few years an ever-increasing variety of dyes and organic chemicals, were being produced; the quality of its earlier products were improved, and between 1920 and 1930 a broad range of products were improved, and established. Today during World War II we have a self-sufficient, integrated organic chemical dyestuffs and other materials vital to the war effort. In addition, research in these fields resulted in the development of neoprene-chloroprene rubber, synthetic camphor, pharmaceutical chemicals, refrigerants, tetra ethyl lead, textile water repellents, and dyeing assistants.

Plasticizers-Glycerin and Sugar

The situation as far as plasticizers are concerned is tense and all indications point to continued difficulties in securing effective softening agents during 1943. The status of the commonly used plasticizers now is:

1. Glycerine

Under price ceiling and General Preference Order M58, as amended. Paper mills using glycerine are limited as follows:

a. Up to 50 pounds monthly can be had without specific authorization.
b. Mills ordering between 50 and 1150 pounds monthly require no specific authorization, but are limited to acceptance of 70% to 1/12 of the amount consumed during 1940.
c. Mills ordering over 1150 pounds monthly require no specific authori-

zation and are allocated glycerine in accordance with priority ratings and type of product manufactured. The allocation schedule is issued monthly; that for December, 1942, being:

Product	Rating AA-4 or better	A-1-a to A-1-R	A-2 to A-10	Others
Transparent wrappers	100%	100%	90%	80%
Greaseproof and glassine	100	100	90	80
Wrappers other than transparent	100	100	50	40
Paper (general)	100	100	60	50

All percentages indicated the ratio between the amount granted and the amount requested, except in the case of "others", where the percentage granted is based on the average monthly consumption during 1940.

CURRENT PRICES

O. P. Glycerine (95%)	drs. carload	$0.18¼	lb. del.
Dynamite Glycerine	drs. carload	$0.18¼	lb. del.
High Gravity Glycerine	drs. carload	$0.18¼	lb. del.
Yellow Distilled Glycerine	drs. carload	$0.18¼	lb. del.

The chances of any easing of the glycerine situation are very slight. Lend-lease and domestic requirements are increasing, while at the same time production is being curtailed by the loss of high glycerine yielding fats, such as coconut oil. A recent Washington conference indicated that it would soon be necessary to cut down, if not eliminate entirely, the amounts of edible fats and oils delivered to soap factories. Since glycerine is produced almost entirely as a by-product of soap manufacture, further restrictions seem inevitable.

2. Glycols

Under allocation orders. The use of glycols for "general plasticizing" is limited by the December, 1942, schedule to:

Diethylene glycol	81%	of amounts requested monthly
Ethylene glycol	69%	of amounts requested monthly
Triethylene glycol	11%	of amounts requested monthly
Propylene glycol	100%	of amounts requested monthly

CURRENT PRICES

Diethylene glycol	drs. carload	$0.16½	lb. f.o.b. works
Ethylene glycol	drs. carload	0.15½	lb. f.o.b. works
Triethylene glycol	drs. less carload	0.26	lb. f.o.b. works

No hopes are held out for increased availability.

3. Invert Sugar

Under price ceiling and General Preference Order M55, as amended, mills using invert sugar are limited during periods of two consecutive months to a percentage of the amount consumed during the corresponding period of 1941. The percentage allowed is announced at the beginning of the period and for November and December, 1942, is 70%. Certificates for the permissible amounts are issued to consumers at the start of the two-month periods by the various local rationing boards. These certificates must accompany purchase orders. Prospective consumers with no record of using invert sugar during 1941 may obtain certificates by showing the boards good cause why such certificates should be issued.

CURRENT PRICES

Invert sugar	barrels	$0.0525-$0.66 lb. f.o.b. works

Invert sugar is made from cane sugar and the amounts available depend on supplies of that commodity. Shipping difficulties have hampered the importation of the normal amounts of raw sugar from the West Indies, where tremendous stocks are on hand. Should shipping become more available the invert sugar position would be greatly eased.

4. Corn Sugar and Syrup

Not officially rationed or allocated, but under voluntary apportionment by the various producers in as equitable a manner as is possible. The amounts required for lend-lease and other government operations, together with expanded domestic needs, are such that the quantity available to any consumer is somewhat less than 70% of his consumption in 1941.

CURRENT PRICES

Corn Syrup 43 degrees Be.	bbls. carload	$0.0522 lb. f.o.b. Chicago
Corn Syrup (refined)	paper bags, car	0.0445 lb. del. New York
Corn Syrup (refined)	cotton bags, car	0.0450 lb. del. New York

There are no indications of immediate relief.

5. Sorbitol

Sorbitol is being sold by the producers on a strict priority basis. Some deliveries are being made on ratings as low as A-10; with higher ratings standing a much better chance. Production has been increased during 1942 by a new plan which started operations in July. An extension is now under way which is expected to enter production in February, 1943.

CURRENT PRICES

Sorbitol	drums	$0.17¾ lb. f.o.b. works

New Products

During 1942 a number of products were offered to the mills under various trade names as "glycerine substitutes." Little is known of their composition or relative efficiency as analyses are not usually furnished and the products have not been out long enough for thorough evaluation. Such of them as have had preliminary investigation have shown water contents ranging from 16 to 65%, ash contents from 0.07 to 46.9%, sugars as high as 18% and sometimes varying amounts of glycerine. The indications are that at least some of these products represent attempts to stretch out glycerine by adding hygroscopic inorganic salts, sugars, lactates, water, etc. More will undoubtedly be learned of their possibilities in the near future, but at present no really acceptable substitute has been discovered.

Wax Sizes

During the past year the consumption of wax sizes by the paper industry has continued to grow. This has been largely due to the extension of their use in kraft papers and boards, insulating increased the demand for harder sized paper which, in turn, has expanded the use of wax emulsions.

At least one new type of emulsion has appeared during 1942 which finds its chief use in the sizing of asbestos paper. In the past it has been difficult to render asbestos paper water resistant largely because of the alkaline nature of the fibers. Wax emulsions have been used for this purpose for a number of years, but the new product is reported to give lower percentages of water absorption than have hitherto been attained.

Closely allied to the sizing of paper is the waterproofing of rock wool, and wax emulsions have recently been adapted to this purpose. It has been the practice in manufacturing certain grades of rock wool to spray or otherwise introduce waterproofing materials at or near the point at which the steam jet impinges on the stream of the molten rock as it flows from the cupola. One of the difficulties has been that it has been either necessary to use a solvent or sacrifice good distribution by adding molten material without an extender. Emulsions provide good distribution on the rock wool fibers without the necessity of employing costly materials that have no direct function in the waterproofing.

There has also been considerable development in the lamination of paper with waxes. The amor-

phous petroleum waxes are commonly used for this and during the past year new grades have appeared on the market which render papers very resistant to moisture vapor transfer and are very flexible even at exceedingly low temperatures. These products are comparatively low in cost.

Market conditions have remained stable throughout the year due to the price ceiling imposed by the Office of Price Administration. Some grades of both amorphous and crystalline waxes have been scarce, but so far as the wax size field is concerned, there has been no difficulty in finding satisfactory substitutes when standard materials were temporarily unavailable. At the present time most of these materials tend to be in more plentiful supply rather than otherwise.

Enzymes

As to the availability of the various enzymes used in the paper trade during 1943, we believe that all of the materials on the market today will be readily available throughout the year. For the most part they do not require any essential raw materials other than alcohol and for the most part this material is reclaimable. It is quite possible, however, that due to breakage of equipment it might involve some slight shortage although this possibility is very remote.

With regard to substitutes for enzymes in the field of starch conversion, it is quite possible that chlorinated starches or acid converted starches might be used although we believe for the most part mill men having once familiarized themselves with enzyme conversion will not readily revert to acid converted or chlorinated starches for, enzyme conversions do afford very definite advantages.

We feel that the consumption of the quantity of enzymes used in the paper industry will probably remain intact through the year. Recent government orders curtailing paper production might tend to decrease the quantity of enzyme consumed but we believe that the mills which will be swinging over to this type of product will make up for any deficiencies.

Due to the competitive market, we believe it will be quite possible that there will be a lowering of price in the field of enzymes and we also believe that there will be definite improvement in quality with the development of the new enzymes. Whether or not the manufacturing companies will be able to produce these enzymes is a real question, as in many cases they might require additional equipment and under present conditions this would be very diffcult to obtain.

Synthetic Resins

The use of synthetic resins for the modification of fibrous and nonfibrous paper making materials, received a great deal of attention in the paper industry during 1942. Although most of this was experimental work, some developments were put into commercial practice. The water soluble, thermosetting resins, urea, melmaine and phenol-formaldehyde have been of the greatest interest. Urea-formaldehyde is being widely used as a tub size for producing many important types of wet strength papers. It is used even more widely for waterproofing the starch used as the adhesive in the production of solid fibre and corrugated board. Phenol-formaldehyde resins are of interest in the production of low pressure laminations.

Melamine-formaldehyde resins attracted considerable attention, being unique in that they not only increase wet strength but improve any burst and tensile strength and markedly enhance the folding endurance. While the resin itself has practically no effect on the resistance of paper to the absorption of water, it does intensify the effect of rosin size when the latter is present. Resistance to rubbing and abrasion in the presence of moisture is also improved. The various effects of the resin are practically unmodified by prolonged storage of the paper even under conditions of high temperatures and relative humidity.

Synthetic resins, as a class, have not increased in price and certain of them have been reduced in 1942. During the forepart of the year, certain types of resins were available for nonwar applications but today, only a very small amount of any of the different types is available for other than war outlets.

Chlorine

On the basis of (1) chlorine distribution during 1942, (2) the bringing into production of chlorine plants at certain Government arsenals, (3) increased capacity to privately owned chlorine plants, and (4) restrictions on the pulp industry, it would appear that the merchant chlorine industry can fill the merchant chlorine requirements of the pulp and paper industry for 1943. However, this is no prediction as to what the Government requirements may be throughout 1943. Government requirements and the sanitary needs are prime.

As in 1942, there appears to be no substitute for chlorine as a bleaching agent for the pulp and paper industry.

The purity of commercial chlorine continues to be of high order. Aside from the standards set by merchant producers, it must be remembered that dirty chlorine cannot be shipped with impunity for safety reasons.

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Never before in the history of paper making has *service* been more important. Material shortages and inexperienced labor are handicapping many mills. So far as felts are concerned, *Orr service* is normal and no user of Orr felts is being inconvenienced. On the labor problem Orr is also cooperating . . have just published a booklet on the care of felts. Your copy is waiting. Write for it.

THE ORR FELT & BLANKET CO.
PIQUA, OHIO

ORR FELTS

Wood Pulp Allocations For August

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., Aug. 4, 1943—Available supplies of wood pulp have been allocated by the War Production Board Pulp and Paper Division for the month of August so as to maintain maximum production of certain kinds of paper and paperboard necessary to carry on the war, and sustain an effective wartime civilian economy, it was announced by the Division. It was explained that allocations were made so as to avoid the closing of paper mills.

Simultaneously, the Pulp Allocation Committee recommended that the paper making industry plan its future operations in the expectation that unless the most strenuous efforts are made to increase the production of pulpwood, the supply of wood pulp will continue to decline and that further restrictions on its use will therefore be inevitable.

There have been serious declines in both pulpwood and wood pulp production and inventories during the first six months of 1943, the Pulp and Paper Division pointed out. Pulpwood receipts during the six months ending June 30, 1943, dropped 24% when compared with the first half of 1942, and pulpwood inventories as of June 30, 1943, were 32% below the level of June 30, 1942. Total receipts of pulpwood during the first half of 1942 totaled 8,708,973 cords compared with only 6,609,095 cords during the first six months of this year. Inventories of pulpwood as of June 30, 1942, totaled 3,428,590 cords, whereas on June 30, 1943, the inventory of pulpwood was down to 2,324,375 cords.

In the same comparative periods, wood pulp production declined nearly 17% and wood pulp inventories dropped 25%. Wood pulp production during the first half of 1942 amounted to 5,601,432 tons, but dropped during the first half of this year to 4,653,270 tons. Inventories of wood pulp as of June 30, 1942, totaled 864,333 tons compared to a total of 674,449 tons on June 30, 1943.

Until the supply of woods labor can be augmented and the production of pulpwood increased, the WPB will be forced to allocate available supplies of wood pulp to both integrated and non-integrated paper mills, restricting the amount of pulp which may be used in each mile so as to keep the production of essential paper and paperboard at the maximum levels.

Integrated mills were authorized to use the full amount of their wood pulp production, except to the extent that it proved necessary to divert wood pulp withheld by integrated mills under Order M-93-a for the purpose of fulfilling Lend-Lease and Office of Economic Warfare export requirements and to maintain the necessary production of jute container board, multi-wall bag paper and certain other essential production in non-integrated mills.

Both integrated and non-integrated mills were restricted in their use of market wood pulp so as to prevent a further decline in the total inventory of market wood pulp.

Sandy Hill Selective Drive Endorsed

HUDSON FALLS, N. Y., August 2, 1943—A paper mill installation that has interested many executives and shop men in the industry, has just reached the end of its third year "on test" with results that are highly gratifying.

Three years ago a selective drive manufactured by the Sandy Hill Iron and Brass Works, embodying principles long in use, but new in this particular application, was installed in the Deferiet plant of the St. Regis Paper Company. It was placed in service driving the No. 5 Deferiet machine.

This new departure contrasts strongly with mechanical and sectional electric drives used elsewhere in the mill. Consequently the engineers viewed the installation with a great deal of interest. Extreme fineness of adjustment of draws between paper machine sections distinguishes this drive. The drive employs in a new way the vari-pitch sheave which has been in successful operation over a long period of time.

A recent letter to the Sandy Hill Iron and Brass Works from the St. Regis Paper Company state. "We endorse the Sandy Hill Selective Drive to the fullest extent. Our unit has been in service driving No. 5 Machine at Deferiet for approximately three years, and we consider it superior to any of our other mechanical drives or electric drive. It is more dependable, more flexible, lower in first cost, lower in power consumption, and lower in maintenance. The fact is we still have the original V-belts in good condition and in operation."

The manufacturers point out that with the selective drive, variation in the draw is more selective than in electric drives. Possibility of interruption due to electric failure is materially reduced if not obviated. The shock of the load when the machine starts is absorbed, relieving momentary shocks on gears, clutches, etc., and avoiding excess wear.

Belt slippage is prevented by the simple yet unique method of keeping constant tension on the belts, and compensating for a reasonable amount of stretch when the machine starts. This tension is kept constant through a control by weights, Houdaille shock absorbers or similar devices, optional with the mill. Hand control for the varied speeds of some units is very satisfactory. However, if the last word is desired, push buttons located at points of vantage permit starting and stopping, changing to higher or lower speeds.

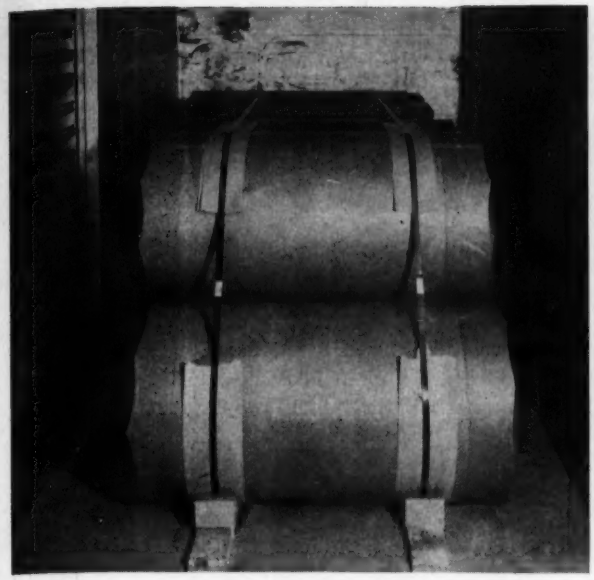
The space saving in the selective drive is being commented on, too. No mezzanine floor nor basement is needed for the installation. And the fire hazard on on account of static electricity is avoided.

Engineers who have seen the St. Regis installation are enthusiastic in their approval. Regarded as well worth looking into is the selective drive installed in combination with the Sandy Hill hypoid corner drive units.

Hawthorne Discontinues Sulphite Bond

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., Aug. 2, 1943—The Hawthorne Paper Company has discontinued all lines of sulphite bond, including Triton. G. H. Gerpheide, president of the company, has issued the following letter to the trade, under the date of July 27: "The present government restrictions on production and the increasing curtailment of supplies of wood pulp will unquestionably result in further curtailment in our output. We must take steps to adjust our business to this condition. The logical step appears to be that of reducing our output of papers made entirely from wood pulp. Therefore, we will, at least until the pulp situation improves, discontinue accepting orders for Triton and other sulphite bond papers. It is with reluctance that we take this action, but it seems necessary."



Prevent Damage in Transit to Paper with STANLEY STEEL STRAPPING

There's no paper to spare these days for needless waste caused by damage in transit. Make sure your shipments arrive as they left the mill . . . end troublesome claims and replacements . . . give the proved protection of Stanley Steel Strapping and Car Banding.

Quickly applied to skids, rolls, cases, or cartons, Stanley Steel Strapping speeds output, saves man-hours in the shipping room. It provides dependable reinforcement to withstand long trips and rough handling by overburdened carriers, reduces tare weight and bulk, saves valuable cargo space, conserves packing materials.

Stanley Car Banding lowers bracing costs, replaces heavy, bulky, wood bracing, saves loading and unloading time, reduces demurrage charges.

The Stanley Steel Strapping and Car Banding Systems include tools, reels, and accessories for preparing every type of shipment. Write for complete information. The Stanley Works, Steel Strapping Div., New Britain, Conn.

PROMPT SHIPMENTS to War Production Plants

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TITANIUM DIOXIDE

For ECONOMY . . . MAXIMUM OPACITY and HIGHER STRENGTH

Suitable for ALL types of paper ranging from thin printing papers and waxing tissues to coated book and magazine stocks.

UNITANE O-R150 was especially developed for paper pigmentation. Its excellent dispersion in water promotes good retention and excellent sheet formation. As a component of the beater furnish, it produces whiter sheets of great brilliance, and superior printing qualities.

SAMPLES of UNITANE O-R150 will be sent promptly upon request.

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New York Paper and Pulp Market Review

WPB Prohibits Manufacture of Some Paper Items And Places 30% Cut On A Large Number of Other Paper Items—OPA Issues New Price Amendment Covering Some Grades of Wood And Rag Pulps.

Office of the PAPER TRADE JOURNAL.
Wednesday, August 4, 1943.

Declining pulpwood supplies which will necessitate a sharp reduction in wood pulp tonnage this year, are factors currently exerting strong influence to strengthen the demand for all types and grades of paper and paperboard.

Current reports and announcements from government agencies reflect a rather sharp curtailment in some types of less essential papers and also restrictions in the uses of some important types, such as glassine and vegetable parchment.

Conservation Order M-241-a, prohibits the manufacture of a number of paper items and places a 30% cut, effective October 1, 1943, on a large number of other paper items. Full production of most essential paper items will be continued, but the use of paper and paper board for certain display purposes is sharply curtailed.

Paper production for the week ended July 24 was estimated at 90.5%, compared with 79.2% for 1942, with 100.9% for 1941, with 87.6% for 1940, and with 81.7% for the corresponding week for 1939.

Paperboard production for the week ended July 24 was 97.0%, compared with 74.0% for 1942, with 92.9% for 1941, with 74.0% for 1940, and with 70.0% for the corresponding week for 1939.

Wood Pulp

Amendment 8 to Maximum Price Regulation 114, issued by the OPA on July 27, 1943, states that manufacturers of sulphite or special chemical, high Alpha or glassine grades, Mitscherlich, and sulphate, producing such wood pulp with equipment not designed for their production for sales on the open market, and manufacturers of pulp in whole or part from rags, paper stock or other fiber material other than wood, shall, before making sale, submit to the Administrator a sworn statement including grades, proposed sale prices and names and addresses of customers to whom such pulps were sold in the fourth quarter of the year 1941, and thereafter, together with an itemized statement of the costs of producing such pulps per air dry ton.

Rags

Demand for new cotton cuttings is reported steady, with mill buying most active in the colored grades. Prices on all grades of paper making rags are at ceiling levels.

Old Rope and Bagging

Mill buying of old No. 1 Manila rope continues to steadily absorb all available supplies. Demand for other fibers continues active.

Trading in scrap bagging is still on a cautious scale, awaiting government adjustment of the restrictions issued by the WPB on bagging now in effect. A more equitable ruling on the sale of scrap bagging is eventually expected. Prices are nominal.

Old Waste Paper

Mill demand and buying of old waste paper is reported very active at this date. It is also reported that the drive of the Salvage Branch of the WPB for increased collections of paper in many parts of the country will now include the Greater New York area. Lack of adequate supplies of old kraft is reported serious. Ceiling prices prevail in all grades of paper stock.

Twine

No important change in the twine market has been reported this week. Military requirements continue very heavy and civilian demand is active for the more limited supplies of all fibers, other than cotton. Prices are firm and stocks of some imported fiber twines are reported in some quarters as relatively low.

OPA Issues Alternate on Kraft Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., Aug. 4, 1943—Manufacturers of kraft wrapping paper may as an alternative state merely the grade of paper on the invoice when selling four designated types of paper instead of following the former single requirement of stenciling or labeling the grade on each roll or bundle, the Office of Price Administration announced today.

This alternative, provided because of the Taft Amendment to the Emergency Price Control Act of 1942, which restricts OPA from requiring grade labeling under certain conditions, is embodied in Amendment No. 8 to Maximum Price Regulation No. 182 (Kraft Wrapping Papers and Certain Bag Papers and Certain Bags) effective August 7, 1943.

The four types of paper covered are No. 1 kraft wrapping paper, super-standard kraft wrapping paper, imitation kraft wrapping paper, and No. 1 unbleached kraft butchers wrapping paper.

In those cases where the rolls or bundles are not so designated according to type, merchants or distributors, when making sales of them, must state on their invoices the type of paper that the rolls or bundles contain.

To Represent Clinton Co. in N. E.

C. Morganstern, who for the past two and one-half years represented the Clinton Company with headquarters in Cincinnati, has been appointed manager of the New England office of the Clinton Sales Company, Inc., 15R McGrath Highway, Somerville, Mass., succeeding P. S. Bolton, who resigned.

Daughter Born To Tayloes

MEMPHIS, Tenn., August 2, 1943—Announcement has just been made of the birth of a daughter to Captain Howard Tayloe, executive vice-president of the Tayloe Paper Company, and Mrs. Tayloe.

West Virginia Pulp and Paper Company

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Chicago

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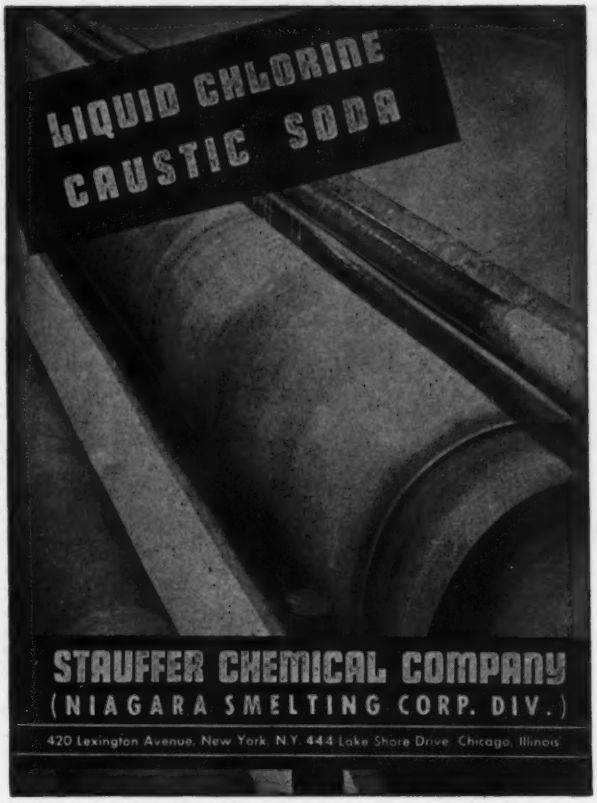
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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, August 4, 1943.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. The pulp is currently quoted at $40 per ton in barrels, at works; the powder is offered at $60 per ton, f.o.b., works. Demand reported fair for the week.

BLEACHING POWDER—Prices on bleaching powder are firm. Current demand reported active. Bleaching powder is currently quoted at $2.50 per 100 pounds, in drums, at works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more, 24 cents per pound; 2,000 pounds, 24¼ cents per pound; less than 2,000 pounds, 24¾ cents per pound, f.o.b., shipping point.

CAUSTIC SODA—Prices on caustic soda are reported unchanged. Supply for the current week is reported tight. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged. Demand reported fair for the current week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton at mine. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine unchanged. Government demand for war use continues heavy. Prices firm. Supply easy. Chlorine is currently quoted at from $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—Quotations on some grades of rosin are higher for the current week. "G" gum rosin is currently quoted at $3.92 per 100 pounds in barrels, Savannah. "FF" wood rosin is currently quoted at $3.72 per 100 pounds in barrels, New York. Seventy per cent gum rosin size is currently quoted at $4.11 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm. Demand reported light for the current week. Domestic salt cake is currently quoted at $15 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Market tight. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are unchanged for the current week. Supply situation tight. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Supply more limited for the current week. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at from $1.75 to $1.85 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices of sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $16 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—

Roll, contract	*$54.00	@	—
Sheets	62.00	"	—

* OPA Maximum Price.

Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill

Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—

* OPA Manufacturers' Prices.

Tissues—Per Ream—Carlots

White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—

Toilet—1 M. Sheets—Per Case

Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—

Paper Towels, Per Case—

Unbleached, Jr.	2.60	"	—
Bleached, Jr.	3.20	"	—

Manila—per cwt.—C. l. f. a.

No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
No. 2 Manila Wrapping, 35 lb.	5.75	"	6.00

Boards, per ton—

News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	.... "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	.... "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.40 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55@$12.75	$11.70@$14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.30
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00
Unbl. Softwood Sulphite	65.00@ 66.00
Bl. Hardwood Sulphite	73.50
Unbl. Hardwood Sulphite	63.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich	72.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate	82.00
S. Semi-Bleached Sulphate	75.00
N. Unbl. Sulphate	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	66.00
Unbl. Soda	62.00
Groundwood	46.00

Transportation Allowances Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags (Prices to Mill f. o. b. N. Y.)

Shirt Cuttings— New White, No. 1	6.50	@	7.25*
Silesias No. 1	—	"	5.75*
New Unbleached	6.75	"	7.50*
Blue Overall	—	"	5.50*
Fancy	—	"	3.50*
Washables	—	"	3.00*
Bleached Khaki Cuttings	—	"	4.25*
Unbleached Khaki Cuttings	—	"	3.50*

* OPA Maximum Prices.

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More than just a EXCELSIOR KNOX Woolen Co. Camden, Me. FELTS & JACKETS *TRADE MARK*

BUT also a guarantee by men who for 78 years have prided themselves in making finer felts. TO YOU —this is the mark of dependability, longer felt life and greater saving.

KNOX WOOLEN CO.
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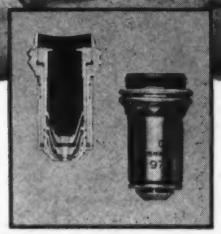

Accuracy that Counts on all Fronts

At first glance there would seem to be little relationship between an intricate, ten-foot long height finder and a microscope objective with lenses of less than one millimeter in radius. Yet both are the products of the same eyes, the same facilities, the same standards of accuracy, the same experience. Both are aiding in America's war effort. Both are products of Bausch & Lomb.

The lens computing and grinding skills that for years have produced the minute, exceedingly accurate lens components of the microscope objective are today also being employed in the production of height-finders and gunfire control instruments that are helping America's armed forces to win an earlier Victory.

This quantity production of precision optical instruments, pioneered and fostered by Bausch & Lomb through years of peace, has become a highly valued asset to an America at war. Here again, because of its wartime accomplishments, Bausch & Lomb will be able to extend its optical services to peacetime pursuits when Victory is won.

Bausch & Lomb Oil Immersion Objective— 97X-N.A.-1.25

For Bausch & Lomb Instruments essential to Victory — priorities govern delivery schedules.

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POTDEVIN

Paper Bag Machines, Aniline & Oil-Ink Presses, Waxing, Gluing, Varnishing, Laminating Machines.

POTDEVIN MACHINE CO.
EST. 1893
1223 38th ST BROOKLYN N.Y.

POTDEVIN

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.25	@	4.35
Wool Tares, light	4.25	"	4.50
Wool Tares heavy	4.50	"	5.00
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.50	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.57½	"	—
Mixed Books	.85	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.15	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	.85	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17¾	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	.	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1	.07½	@	.07½
New White No. 2	.04½	"	.05
Light Silesias	.04½	"	.04¾
Silesias, No. 1	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached	.07¼	"	.07½
Washable Prints	.03¾	"	.03½
Washable No. 1	.02	"	.02¼
Blue Overall	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales	.03¼	"	.03½
New Black Soft	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.	.03	"	.03¼
No. 2 Mixed	.02¼	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas	.04¾	"	.05¼
New Black Mixed	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope	3.75	"	—
Mixed	1.00	"	1.50
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.67½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.15	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Overissue News	.85	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.15	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	3.75	@	4.00
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	*4.25	"	—
Mixed Rope	1.35	"	1.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.60	"	3.85
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	4.65	"	4.87½
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Bagging	1.35	"	—*

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¾	"	.05
New White No 1.	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06¼
Underwear Cutters, Bleached	.06¾	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¼
New Black Silesias	.03	"	.03¾
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¾	"	.03½
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.06¼	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Heavy Books & Magazines	1.67½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—